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SATURDAY, OCTOBER 1, 2022

10:30 am – 11:30 am

RF1 Abstract Session: Administration/Practice Management

Room 312/313/314

50 Hospital Admission Rates and Mortality Among Emergency Department Patients With COVID-19 Discharged With Remote Patient Monitoring With or Without HO2ME (Home Oxygen) – A Value-Based Approach
Cast K, INTEGRIS SW Medical Center

96 Using a Digital "Equity Dashboard" to Understand Language Disparities in Time to Pain Medication
Burke, C, UCSF

200 A Quantitative Assessment of Emergency Department Boarding and its Association With Decreases in Operational Efficiency: A Multicenter Nationwide Study
Tyminski, C, Warren Alpert Medical School of Brown University

203 Incorporation and Utilization of a Medication-Assisted Treatment Initiation 'Procedure Template'
Walter, L, University of Alabama at Birmingham

340 The Accuracy of Predictive Analytics in Forecasting Emergency Department Volume Pre and Post-COVID Pandemic
Smith Shain, R, Warren Alpert Medical School of Brown University

RF2 Abstract Session: Airway/Diagnostics/Basic science

Room 306

31[EMF] Intubatable 3D Printed Airway Manikin: A Feasibility Study for Replicating Real Patient Anatomy
Cardell, A, Maimonides Medical Center

70 A Comparative Evaluation of 3D Printed Versus Standard Suture Materials
Langenfeld, J, University of Nebraska Medical Center

113 A Novel Video Laryngoscope Device (IVOS Boss G4) for Minimizing Aspiration Events
Mendoza, J, University of California Irvine School of Medicine

157 Outpatient Management of Spontaneous Pneumothorax With Thoracic Vent: A Retrospective Analysis of a Device Specific Treatment Modality
Mells, A, Kaiser Permanente, San Diego

180 A Cellular Host Response Test May Enable Compliance With the Medicare Sepsis Quality Measure While Promoting Antimicrobial Stewardship Aims
O'Neal, H, LSU Health Sciences Center

226 What Is the Effect of Training on the Performance of Different Video Laryngoscope Geometries versus Direct Laryngoscopy to achieve First Pass Success during Emergent Tracheal Intubation? A Systematic Review and Meta-analysis
West, J, NYC Health + Hospitals, Lincol

RF3 Abstract Session: Cardiovascular (ACS)

Room 305/309

43 Artificial Intelligence Versus Physicians on Interpretation of Printed Electrocardiography Images: Diagnostic Performance for ST-elevation Myocardial Infarction
Choi, YJ, Department of Emergency Medicine, Ajou University School of Medicine

49 Comparing the Safety and Efficacy of a Rapid High-Sensitivity Cardiac Troponin I Protocol Between Hospital-Based and Free-Standing Emergency Departments
Miller, J, Henry Ford Health / Detroit Hospital

90 Economic Impact: A Cluster Randomized Trial of a Rapid High-Sensitivity Cardiac Troponin I Protocol
Nassereddine, H, Henry Ford Health System

101 Differentiating Type 1 from Type 2 Acute Myocardial Infarction in the Emergency Department Using the N-terminal Pro B-type Natriuretic Peptide/High-sensitivity Cardiac Troponin T Ratio
Nowak, R, Henry Ford Health System

265 Sinus Tachycardia is Rare Among Hemodynamically Stable Patients With Occlusion Myocardial Infarction
Trostel, S, Carolinas Medical Center

287 Influence of Time to Diagnosis on Time to Percutaneous Coronary Intervention for Emergency Department ST Elevation Myocardial Infarction (STEMI) Patients: Door to ECG Matters
Bloos, S, Stanford University

RF4 Abstract Session: Cardiovascular (non-ACS)

Room 310/311

40 30-day Outcomes of Hypertensive Emergency Department Patients Discharged With Antihypertensive Therapy
Todd, B, Beaumont Health

55 Andexanet Alfa is Associated With Reduced In-hospital Mortality Compared to 4-Factor Prothrombin Complex Concentrate Among Patients With Intracranial or Gastrointestinal Bleeding
Fermann, G, University of Cincinnati

56[EMF] Augmenting D-dimer Testing for Pulmonary Embolism Rule-Out in the Emergency Department With Artificial Intelligence
Fermann, G, University of Cincinnati

115 A Novel Order Set Driven Emergency Department Atrial Fibrillation Algorithm Drives Compliance With Risk-Appropriate Thromboembolic Prophylaxis and Increases the Frequency Of Discharge to Home.
Johnson, B, Indiana University School of Medicine, Department of Emergency Medicine. Indianapolis, IN

310 Emergency Department Oral Anticoagulation Prescribing Practices for Acute Atrial Fibrillation: Pre-Implementation of an Electronic Clinical Decision Support Tool
Kinney, E, Oregon Health & Science University

314 Opportunities to Optimize Implementation of an Emergency Department Acute Heart Failure Risk Tool: A Mixed-Method Study of Physician Openness to Clinical Decision Support
Sturmer, L, Touro University Medical School

RF5 Abstract Session: Disaster Medicine/EMS

Room 307/308

19 Utilization of Advanced Providers In the Field for Medical Custody Clearance
Makda, H, St George's University

84 Bystander CPR Rates for Out-of-Hospital Cardiac Arrest Higher in Rural Areas Versus Urban Areas
Hart, J, University of Iowa Carver College of Medicine

85 An Assessment Of Out-of-Hospital Provider Education and Sequelae Around Breaking Bad News
Tillett, Z, Maine Medical Center

SATURDAY, OCTOBER 1, 2022 —*cont'd*

330 EMS Operational Adaptations to the COVID-19 Pandemic
Raavicharla, S, Virginia Commonwealth University School of Medicine

331 Emergency Medical Service Providers Perspectives of Pediatric Non-Transport
Brown, K, Children's National Hospital, The George Washington University School of Medicine & Health Sciences

332 The Hidden Factors of Health: A Mixed Methods Study of EMS Provider Knowledge and Perceptions of Social Risk Factors
Gorgens, S, Zucker-Northwell NS/LIJ

11:30 am – 12:30 pm

RF6 Abstract Session: Education

Room 312/313/314

160 Emergency Medicine Attending Physician Performance of Pigtail and Thoracostomy Tube Insertion in a Simulated Environment
Pokrajac, N, Stanford University

186 Rethinking Emergency Department Clinical Guidelines for Use at the Bedside
Pondicherry, N, UCSF School of Medicine

230 Learning Smarter: An Adaptive Business Curriculum for Residents that Works
Stark, N, University of California, San Francisco

288 Relationship Between Socio-Economic Background of International Medical Graduates and Residency Match Results
Hunter, D, Mayo Clinic

344 Direct Patient Impact from a State-Wide Point-of-Care Ultrasound Curriculum in a Distributed Campus Medical School
Jaschen, K, Medical College of Georgia

RF7 Abstract Session: Geriatrics/Palliative

Room 306

156 Dissemination and Implementation of Age-Friendly Care and Geriatric Emergency Department Accreditation at Veterans Affairs Hospitals
Hwang, U, Yale School of Medicine

231 When Time Is Short: Making the Case for Emergency Department Goals of Care Discussions Prior to Transfer
Hwang, U, Yale School of Medicine

242 Computed Tomography Imaging of Geriatric Patients With Uncertain Head Trauma
Turchiaro, M, Florida Atlantic University Charles E. Schmidt College of Medicine, Boca Raton, Florida

308 A Geriatric Emergency Medicine Assessment Team Reduces Hospital Length of Stay through Faster Discharge to Subacute Rehabilitation
Keene, S, Beaumont Health, Royal Oak, MI

335 "4Ms" Conversation in the Emergency Department: A Qualitative Study
Sheber, M, University of Iowa Carver College of Medicine

348 Differences in Antipsychotic and Sedative Administration in Community vs Academic Emergency Departments Across a Health System
Ciampa, K, Massachusetts General Hosptial

RF8 Abstract Session: Public Health/Injury/Illness Prevention

Room 305/309

28 Addressing Workplace Violence: Healthcare Staff Safety a Culture of Caring
Barata, I, Northwell Health System

35 Increasing Naloxone Prescriptions Through Electronic Medical Record Best Practice Advisory Alerts
Printen, S, Henry Ford Hospital

71 HIV Pre-exposure Prophylaxis in the Emergency Department: A Systematic Review
Nagy, T, Prisma Health, Greenville, SC

256 Trends In Opioid Overdoses During the COVID-19 Pandemic
Tran, C, University of California San Francisco

290 Trauma Patients in Police Custody - Who Are They and How Were They Injured?
Isaacson, K, Emory University SOM

313 Aging in Illinois Prisons in the Time of COVID-19
Bolotnikov, J, Loyola Stritch School of Medicine

RF9 Abstract Session: Infectious Diseases (COVID-19)

Room 310/311

173 Leveraging Syndromic Surveillance Data to Create Emergency Department COVID19 Data Visualization Tool
Nilz, M, American College of Emergency Physicians, Irving, Texas

222 ED-ACT Examining D-dimer and empiric Anti-coagulation in COVID-19 related Thrombosis
Pai, E, Beaumont Health - Royal Oak

280 Emergency Department Predictors of Mortality for Adult Patients With Severe Coronavirus Disease-19 (COVID-19) in a Tertiary Hospital: A Retrospective Cohort Study
Lingad, J, St. Luke's Medical Center-Quezon City

333 Prevalence of Moral Injury and its Clinical Consequences Among Filipino Emergency Department Physicians During the COVID-19 Pandemic: A Cross-Sectional Study
Lingad, J, St. Luke's Medical Center-Quezon City

358 The Impact of COVID-19 on Diabetic Ketoacidosis Patients
Khan, F, SUNY Downstate

RF10 Editor's Pearls

Room 307/308

12:30 pm – 1:30 pm

RF11 Abstract Session: Infectious Diseases

Room 312/313/314

25 Derivation and Validation of a Clinical Decision Rule to Risk Stratify Emergency Department Patients Diagnosed With Seasonal Influenza
Pajor, M, Washington University St. Louis School of Medicine

47 A Host Protein Test Based on TRAIL, IP-10 and CRP for Differentiating Between Bacterial and Viral Infection has Potential to Improve Patient Selection for Blood Culture Utilization
Neuenschwander,J, Doctors Hospital, Columbus, Ohio USA

114 Validation and Comparison of Triage-Based Screening Strategies for Sepsis
Rahmati, K, UCLA David Geffen School of Medicine

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117 Impact of Air Pollutants on Deep Learning Forecasting of Emergency Department Patient Arrivals
Etu, E, San Jose State University

153 Risk Factors for Human Immunodeficiency Virus Infection at a Large Urban Emergency Department
Ford, J, University of California, San Francisco

189 Emergency Department Clinician Perspectives on a Pilot Emergency Department-Based Expedited Partner Therapy Program: A Qualitative Study
Ager, E, University of Michigan

RF12 Abstract Session: Neurology

Room 306

116 Diagnostic Accuracy of Neuroimaging in Emergency Department Patients With Acute Vertigo or Dizziness: A Systematic Review and Meta-Analysis Supporting the Guidelines for Reasonable and Appropriate Care in Emergency Medicine
Bellolio, F, Mayo Clinic

176 Point-of-Care Electroencephalography Enables Rapid Evaluation and Management of Non-convulsive Seizures in the Emergency Department
Kaplan, M, Providence, Mission Hospital

187 Association Between Regional Socio-economic Status and Mechanical Thrombectomy for Acute Ischemic Stroke: A Nationwide Multilevel Observational Study
Kim, K, Seoul National University Hospital

253 Pharmacologic Therapy for Migraine Headache in the Emergency Department: A Bayesian Network Meta-analysis.
Allen, R, USC Keck School of Medicine

305 Managing Low and Intermediate Risk Transient Ischemic Attacks in the Time of a Pandemic
Ivy, L, University of Colorado Health, Northern Region

RF13 Abstract Session: Pain Management

Room 305/309

18 Atomized Intranasal Ketorolac Versus Intravenous Ketorolac for Treatment of Severe Renal Colic in the Emergency Department: A Double-Blind, Non-Inferiority, Randomized Controlled Trial
Al-Khalasi, U, Oman Medical Specialty Board

83 An Interim Reporting of Trigger Point Injection for Myofascial Pain Syndrome (T-PIMPS): A 3-Arm, Partially Blinded, Randomized Controlled Trial
Oliver, J, Madigan Army Medical Center, Joint Base Lewis-McChord, WA

247 Comparison of Nebulized Sub-Dissociative Dose Ketamine at Three Different Dosing Regimens for Treating Acute Pain in the Pediatric Emergency Department: A Prospective, Randomized Double-Blind Trial
Butt, M, Maimonides Medical Center

248 Ultrasound-guided Transgluteal Sciatic Nerve Block in Emergency Department Patients With Sciatic Radiculopathy: A Multicenter Prospective Study
Gullikson, J, Mass General Brigham

304 Oral VTS-Aspirin/Ketamine Versus Oral Ketamine for Emergency Department Patients with Acute Musculoskeletal Pain
Butt, M, Maimonides Medical Center

311 Ultrasound Guided Trigger Point Injections for the Treatment of Neck and Back Pain in the Emergency Department: A Randomized Trial
Farrow, R, Mount Sinai Medical Center

RF14 Abstract Session: Pediatrics

Room 310/311

21 Emergency Department Observation of Children With Minor Blunt Head Trauma
Ishimine, P, University of California, San Diego

175 National Trends in Chemical Restraint for Pediatric Behavioral Health Patients in the Emergency Department
Westafer, L, UMass Chan - Baystate

205 Clinical Characteristics, Outcomes, and Interobserver Agreement of Point-of-Care Ultrasound Detected Mesenteric Adenitis in Non-Surgical Pediatric Abdominal Pain: A Retrospective Cohort Study
Stone, D, Icahn School of Medicine at Mount Sinai

250 Tracking Asthma Medication Use in Children After an Emergency Department Visit With a Smart Inhaler and Connected Mobile Application
Gleber, R, Harbor UCLA Medical Center

274[EMF] Acceptability of Video-Based Firearm Safety Education in the Pediatric Emergency Department
Haasz, M, University of Colorado, School of Medicine

1:30 pm – 2:30 pm

RF15 Abstract Session: Psychiatry/Quality Improvement

Room 312/313/314

29 Bridge for Meth: Multi-Center Prospective Evaluation of Emergency Department Initiation of Mirtazapine for Problematic Methamphetamine Use
Herring, A, Alameda Health System, Oakland CA

159 Ketamine Use for Buprenorphine Precipitated Opioid Withdrawal: A Case Series of 10 Patients
Heeney, M, Highland Hospital, Alameda Health System

246 A Multidisciplinary Initiative Improves Care for Psychiatric Patients boarding in the Emergency Department
Davis, J, Ascension Via Christi

306 A Rapid Head CT Scan Protocol for Elderly Stable Patients Improves Time to Intracranial Hemorrhage Diagnosis
Lavine, E, Mount Sinai Morningside Hospital/Icahn Mount Sinai School of Medicine

328 Emergency Department Preparedness to Care For Sexual Assault Survivors: A Nationwide Study
Chalmers, K, The University of Chicago Pritzker School of Medicine

329 Epidemiology and Outcomes of Out-of-Hospital Cardiac Arrest Patients in Flint, MI
Reece, R, University of Michigan

RF16 Abstract Session: Public Health/Injury/Illness Prevention

Room 306

39 Extending Harm Reduction's Reach: Out-of-Hospital Treatment of Opioid Withdrawal via Emergency Medical Service Administered Buprenorphine
Herrala, J, Highland Hospital - Alameda Health System

41 A Nation-Wide Emergency Department Quality Initiative to Improve Care of Patients with Opioid Use Disorder
Hawk, K, Yale University

SATURDAY, OCTOBER 1, 2022 —*cont'd*

126[EMF] Results of a Pilot Linkage to Care Intervention for HIV Negative Emergency Department Patients Referred for Pre-Exposure Prophylaxis (PrEP)
Faryar, K, University Hospitals Cleveland Medical Center

174[EMF] Acute and Recurrent Firearm Injury Rates in an Urban Population (2010-2021): Using Machine Learning to Improve Classification
Mueller, K, Washington University in St. Louis

181 Hospital System Acute Care at Home to Prevent Emergency Department Visits
Simon, E, Cleveland Clinic Akron General

224 Variable NIOSH Quantitative Fit Testing Failure Rates of Reused and Sterilized "Duckbill" Type N95 Masks
Moschella, P, Prisma Health

RF17 Abstract Session: Quality Improvement/Patient Safety

Room 305/309

88 Provider-Only Patients: A Novel Approach to Emergency Department Volume Surge and Covid-19
Gaibi, T, INOVA Fairfax Hospital, Legome, E, Mount Sinai

229 Clinical Decision Support for Antibiotic Stewardship in the Emergency Department
May, L, University of California Davis, May, L, University of California Davis

252 Predicting Adverse Events: Site Differences Using the Emergency Department Trigger Tool
Griffey, R, Washington University in St. Louis School of Medicine

307 Impact of Performing Pre-Radiographic Urine Pregnancy Test on Time Delay from Triage to Radiograph Performance
Legome, E, Mount Sinai

317 Implementation of a Stroke Response Team at a Pediatric Emergency Department
Trigylidas, T, Children's National Hospital

408[EMF] Do Framing and Time Pressure Influence Diagnostic Reasoning Among Emergency Physicians?
Monick, A, Thomas Jefferson University

RF18 Abstract Session: Resuscitation/Critical Care

Room 310/311

127 Effect of Metformin on Survival Outcomes in In-Hospital Cardiac Arrest Patients With Diabetes
Lee, S, Department of Emergency Medicine, Korea University Ansan Hospital, Ansan-si, Republic of Korea

199 Heart Rate Entropy Predicts Impending Rearrest due to Ventricular Tachycardia/Fibrillation but not Pulseless Electrical Activity
Irish, L, The MetroHealth System, Case Western Reserve University

245 Association Between Intra-arrest Blood Glucose Level and Outcomes of Resuscitation at the Emergency Department: A Retrospective Study
Wongtanasarasin, W, Chiang Mai University; University of California, Davis

275 Prothrombin Complex Concentrate Use in a Rural Healthcare Network
Polzin, A, Sanford University of South Dakota Medical Center

276 Relationship between Fluid Administration in the First Three Hours of Sepsis Resuscitation and Mortality
Abe, T, Tsukuba Memorial Hospital/University of Tsukuba

RF19 Abstract Session: Sex & Gender

Room 307/308

51 Gender and Clinician Type: Who is Leaving the Emergency Workforce?
Gettel, C, Yale University

75 Disparities in Emergency Department Wait Times for Female, Transgender Female, Black and Non-English Speaking Patients
Canellas, M, University of Massachusetts Medical School

98 Developing a Protocol for Medication Abortion in the Emergency Department: A Cross-sectional Survey of Emergency Physicians Regarding Providing Abortion Care
Saxena, M, Stanford University

146 Exploring the Impact of Leave and Return to Work Policies on Workplace Lactation for Women in Emergency Medicine
Prendergast, N, Vanderbilt University Medical Center

191 Physician Misidentification in the Emergency Department
Wellman, K, St. Luke's Hospital

316 Gender and the State of Professionalism Between Physicians and Nurses in the Emergency Department
Suh, M, Baylor College of Medicine

2:30 pm – 3:30 pm

RF20 State-of-the-Art I: A United National Readiness Response for Pandemics

Room 312/313/314

RF21 Plenary Session I: Late-Breaking Research in Emergency Care

Room 312/313/314

1 Reversing miRNA-Suppressed Cardioprotective Cardiokine Expression as a Novel Intervention against Sleep Breathing Disorders-Exacerbated Post-MI Remodeling
Ma, M, Thomas Jefferson University

2 Dexmedetomidine Sublingual Film for Acute Agitation in Schizophrenia or Bipolar Disorder by Baseline Clinical Global Impression-Severity of Agitation
Vilke, G, UC San Diego Health System

6 Extended-release Naltrexone and Case Management for Treatment of Alcohol Use Disorder in the Emergency Department
Murphy, C, Eden Medical Center

9 Nationwide Reimbursement Impact of COVID-19 to Emergency Physicians: $6.6 Billion Loss in 2022
Janke, A, University of Michigan

12 Early Mortality Risk Assessment Modeling by Random Forest Analysis of Patients Presenting to a Tertiary Medical Center Emergency Department
Brooten, J, Wake Forest School of Medicine

13 A Novel Approach to Dataset Labeling for Deep Learning Model Development
Duggan, N, Brigham and Women's Hospital

RF22 Abstract Session: Simulation

Room 306

112 Future Uses of Telesimulation: National Survey of Emergency Medicine Residency Simulation Directors
Berger, M, UCLA

SATURDAY, OCTOBER 1, 2022 —*cont'd*

170 Evaluation of Performance of Transesophageal Echocardiography by Emergency Medicine Residents after a Single Simulation-Based Training Session.
Pumarejo, L, Baylor College of Medicine

182 All Clear! Virtual Reality Defibrillator Training For Medical Students Is Feasible, Liked, And Improves Perceived Knowledge, Comfort, And Skills
Treat, C, Stony Brook University

239 Project PANDA: An Individual and Systems Based Approach to De-Escalation
Ahmed, O, Jacobi Medical Center

254 Does Video Pre-Briefing Reduce Cognitive Load During a Simulated ACLS Scenario?
Danboise, B, CHRISTUS Health/Texas A&M

285 Care for the Detainee in the Emergency Department Utilizing Simulation
Elue, E, Cook County Health

RF23 Abstract Session: Social Determinants of Health

Room 305/309

33 Mapping Emergency Department Asthma Visits to Identify Poor Quality Housing
Samuels, E, Brown Emergency Medicine

139 Inequities of Emergency Department Queue Jumping
Sangal, R, Yale University

201 Racial and Ethnic Differences in the Initiation of Low Tidal Volume Ventilation in the Emergency Department
Kennis, B, UC San Diego

202 Drug-Related Arrests among Frequent Emergency Department users are Compounded by Housing Status
Eswaran, V, Baylor College of Medicine

338 A National Snapshot of Social Determinants of Health Documentation in Emergency Departments
Ryus, C, Yale School of Medicine, Department of Emergency Medicine

363 Developing a Survivor-Centered Emergency Department Approach to Tailored Resources of Survivors of Interpersonal Violence
Lu, A, UCSF School of Medicine

RF24 Abstract Session: Telemedicine/Informatics

Room 310/311

27 Combining Machine Learning and Network Science to Cluster Emergency Department Chief Complaints and Diagnoses
Dalton, J, Cleveland Clinic

69 Improving Critical Care Documentation in an Academic Emergency Department via Point-of-Documentation Decision Support
Turer, R, UT Southwestern Medical Center

132 Role of Future Artificial Intelligence Tools for Transitional Care Between Emergency and Primary Care
Hayes, K, McMaster University

279 Change in Emergency Department Telehealth Use for Various Specialties Since the Onset of COVID-19
Boggs, K, Massachusetts General Hospital

319 The Association Between COVID-19 and Telehealth Use in U.S. Emergency Departments
Zachrison, K, Massachusetts General Hospital & Harvard Medical School

341 Short-Term Emergency Department Encounters Following Primary Care Telemedicine Visits in the Era of COVID-19
Zhang, J, Division of Research, Kaiser Permanente Northern California

RF25 Abstract Session: Toxicology/Pharmacology

Room307/308

32 Droperidol on Prevention of Emesis from Cannabinoid Hyperemesis Syndrome (DOPE Study)
Chopra, Q, St Elizabeth Boardman Hospital and Northeastern Ohio Medical University (NEOMED)

76 A Report on 83 Patients with Suspected Methanol Poisoning from Philippine Coconut Wine (Lambanog) Seen at East Avenue Medical Center: A Case Series
De Luna, K, EAST AVENUE MEDICAL CENTER

131 Adulterated Heroin: Presentations and Outcomes of a Large Case Series of Contaminated Heroin
Weiss, S, Reading Hospital

277 Agents of Exposure among Pediatric Transgender Patients: An Analysis of the Toxicology Investigator's Consortium (ToxIC) Registry
Doyle, W, USF / LVHN Campus

282 Buprenorphine Precipitated Opioid Withdrawal in the Emergency Department: A Case Series
Spadaro, A, University of Pennsylvania

SUNDAY, OCTOBER 2, 2022

9:00 am – 10:00 am

Brooks F. Bock Lecture

Room 207

Moving Beyond the Rhetoric: How EM is Leading Firearm Injury Prevention
Wintermute, G, UC Davis Medical Center, Sacramento, CA

10:00 am – 11:00 am

RF26 Abstract Session: Trauma

Room 312/313/314

217 The Impact of Specialized Geriatric Consultation in a Level 1 Geriatric Emergency Department on the Cost of Care
Castillo, E, University of California, San Diego

228 Variation in Lung Protective Ventilation Rates in a Rural Level One Trauma Center
Hatton, C, Maine Medical Center

244 Utility of Abdominal Computed Tomography in Geriatric Patients with Ground-Level Fall
Huang, W, UMass Chan Medical School

323 Phenobarbital Protocol for Alcohol Withdrawal Syndrome Reduces ICU Length of Stay in Trauma and Burn Patients
Raithel, M, University of Michigan

365 A Pilot Study of Hypothermia Prevention in a Hemorrhagic Swine Model
Studer, A, Naval Medical Center San Diego

382 A Survey of Exposure to Community Violence and Adverse Childhood Experiences in Emergency Department Patients
Cachola, L, Cook County Health

SUNDAY, OCTOBER 2, 2022 —*cont'd*

RF27 Abstract Session: Ultrasound

Room 306

38 Resuscitative TEE Collaborative Registry: Development and Implementation of a Multicenter Registry for Focused Transesophageal Echocardiography (TEE) in the Emergency Department and Intensive Care Settings
Teran, F, Weill Cornell Medicine

161 Multicenter Interobserver Agreement of Lung Ultrasound Findings in COVID-19 Patients
Baloescu, C, Yale University School of Medicine

210 Emergency Department Point-of-Care Echocardiography and Lung Ultrasound in Predicting COVID-19 Severity
Baloescu, C, Yale University School of Medicine

223 A Multi-modal Approach to Nerve Block Teaching
Hernandez, M, University of Central Florida/HCA Healthcare GME

309 The Impact of a Brief Educational Intervention on Attending Physician Comfort During Sonographic Image Acquisition and Image Interpretation
Shi, D, South Shore University Hospital/Zucker School of Medicine

355 Using Hierarchical and Cognitive Task Analysis to Develop an Assessment Checklist for Ultrasound-guided Fascia Iliaca Nerve Block Procedures
Dashti, M, Brigham and Women's Hospital, affiliated by Harvard Medical School

RF28 Abstract Session: Venous Thromboembolism

Room 305/309

60 Temporal Trends in the Use of Computed Tomographic Pulmonary Angiography for Suspected Pulmonary Embolism in the Emergency Department
Roussel, M, Emergency Department, Hôpital Pitié-Salpêtrière, Assistance Publique - Hôpitaux de Paris, Paris, France

110 Pulmonary Embolism and Cancer – Can the PERC Rule Still Apply?
Coyne, C, University of California San Diego

152 Pulmonary Embolism in Patients With Cancer: Predicting 30-day Mortality
Coyne, C, University of California San Diego

251 Emergency Department Arrival by Ambulance for Patients Receiving a Pulmonary Embolism Diagnosis is Associated With Hospitalization: Is Coming from Off-Site Radiology an Exception?
Rouleau, S, UC Davis Medical Center

261 Racial and Ethnic Disparities in the Use of Computed Tomography With Angiography (CTA) for the Diagnosis of Pulmonary Embolism (PE)
Luo, D, Zucker School of Medicine

RF29 Abstract Session: Administration/Practice Management

Room 310/311

37 Inequities among Emergency Department Hallway Utilization
Sangal, R, Yale University

78 Regional Healthcare Programme Partnering General Practitioners to Reduce Low Acuity Attendance at the Emergency Department: GPFirst
Lim, S, SingHealth/ Changi General Hospital

108 Characteristics of Emergency Medical Treatment and Labor Act Citations and their Association With Patient Death
Hsia, J, University of Southern California

121 Social and Structural Influences of Emergency Care Seeking Behaviors in Documented and Undocumented Adult Safety-net Patients
Ramirez, C, Keck School of Medicine of USC

148 Accessibility in the Emergency Department for Patients With Disabilities: A Qualitative Study
Carmichael, JH, University of Massachusetts Chan Medical School

352 Trends in Advanced Practice Providers Provision of High Acuity Emergency Department Services from 2013 to 2019
Gettel, C, Yale University

RF30 Abstract Session: Cardiovascular (ACS)

Room 307/308

111[EMF] Exploration of Uncertainty Scale Use in Patients with Potential Acute Coronary Syndrome
Amadio, G, Thomas Jefferson University Hospital

145 External Validation of the Non-Ischemic Troponin Rule Out in Acute Heart Failure (NITRO-AHF) Decision Instrument for Acute Myocardial Infarction or Revascularization
Peacock, J, Indiana University School of Medicine

162 Feasibility and Diagnostic Yield of Mobile Cardiac Outpatient Telemetry (MCOT) Initiated from the Emergency Department
You, A, UC San Diego Health

193 The Incremental Value of Sex in Addition to the History, Electrocardiogram, Age, and Risk Factors (HEAR) Score and High-Sensitivity Cardiac Troponin for 30-day MACE
Kaur, J, Michigan State University College of Human Medicine

324 Effect of High-Sensitivity Troponin on Emergency Department Length of Stay for Patients Evaluated for Acute Coronary Syndrome
Trent, S, Denver Health Medical Center

11:00 am – 12:00 pm

RF31 Abstract Session: Cardiovascular (non-ACS)

22 Efficacy of Emergency Department-Initiated 14-Day Ambulatory ECG Patch Monitors in Patients With Unexplained Syncope
Gershon, C, Oregon Health and Science University

46 The Effect of Mechanical Chest Compression Device on Survival After Out-of-Hospital Cardiac Arrest According to Patient Transport Interval: A Multi-Center Observational Study
Cho, H, Korea University Ansan Hospital

58 The Impact of Cognitive Impairment and Mood Disorders on Quality of Life in Out-of-Hospital Cardiac Arrest Survivors
Kwon, H, Department of Emergency Medicine, Asan Medical Center, University of Ulsan College of Medicine

257 Exploring Brain Natriuretic Peptide and Subclinical Heart Disease in Emergency Patients With Asymptomatic Hypertension
Nelson, B, Icahn School of Medicine at Mount Sinai Department of Emergency Medicine

346 The Coronavirus Disease (COVID-19) May Change Trends of Outcomes Post Out-of-Hospital Cardiac Arrest in Different Hospital Levels: An Updated Trend from 2017 to 2021
Fan, CY, National Taiwan University Hospital Hsinchu Branch

SUNDAY, OCTOBER 2, 2022 —*cont'd*

RF32 Abstract Session: Disaster Medicine/EMS

Room 306

185 Identification of At-Risk Patients in a Statewide EMS "Naloxone Leave Behind" Program
Naumann, J, University of Vermont Larner College of Medicine

196 An Infographic Utilized As A Just-In-Time Tool For Paramedic EKG Interpretation
Pell, R, UCF/HCA Consortium of Greater Orlando

219 Socioeconomic and Racial/Ethnic Disparities in Out-of-Hospital Pain Management for Patients with Long Bone Fractures
Crowe, R, ESO

220 Emergent Medicine: Impact of Out-of-Hospital Red Lights and Sirens (RLS) on Time to Antibiotic Administration in Sepsis Alert Patients
Warkus, E, Emergency Medicine Residency Program at Sarasota Memorial Hospital

294 Rapid High-dose Buprenorphine Induction for Fentanyl Using Patients by Paramedics
Herring, A, Alameda Health System

357 Implementation of a Behavioral Health Paramedic Program for Crisis Navigation
Mercer, M, University of California San Francisco

RF33 Abstract Session: Education

Room 305/309

109 The Impact of the Patient Role on Medical Student Learning during Peer Simulation
Rudinsky, S, Uniformed Services University

144 Foundations of Emergency Medicine Resident as Teacher Experience
Jordan, J, UCLA

216 Impact of Proposed Core Faculty Protected Time Requirements: National Survey of Emergency Medicine Faculty on Work Hours and Associated Job Satisfaction
Thompson, M, University of Florida Gainesville

258[EMF] Students Perspectives of a First Year Firearm Injury Prevention Risk Assessment and Counseling Curricular Intervention
Pappalardo, F, Brown University

349[EMF] Virtual Reality Simulation to Assess EPA-10 in Fourth-Year Medical Students
Malone, M, The Ohio State University College of Medicine

405[EMF] Developing an Opioid Use Harm Reduction Tool for Emergency Medicine Residents
Kelly, T, Mount Sinai

RF34 Abstract Session: Geriatrics/Palliative

Room 310/311

74[EMF] Early Phase Development of the PROM-OTED Tool: The Patient-Reported Outcome Measure – Older Adult Care Transitions from the Emergency Department
Gettel, C, Yale University

95 A Tender-Loving-Care Volunteer Program to Provide Non-Clinical, Supportive Interventions to Older Adults in the Emergency Department
Lam, A, Cedars-Sinai Medical Center

237 Frequency of Discharge Prescriptions Known to Increase Fall Risk for Older Adults: Estimates of Incidence in the United States
Torbati, S, Cedars-Sinai Medical Center

263 Emergency Department Care Transition Barriers: A Qualitative Study of Care Partners of Older Adults With Cognitive Impairment
Gettel, C, Yale University

368 Determining the Combined Impact of Geriatric-Specific Predictors of Hospitalization Among Geriatric Emergency Department Patients
Kiesel, B, Northwestern University Feinberg School of Medicine

371 Implementation of a Geriatric Care Coordinator (GCC) Program for High-Risk Geriatric Patients Following Emergency Department Discharge
Noorvash, D, Cedars-Sinai Medical Center

12:00 pm – 1:00 pm

RF35 Abstract Session: Health Care Policy/Health Services Research

Room 312/313/314

77 Results of a Novel National Emergency Department Chief Complaint Database
Vashi, A, Center for Innovation to Implementation (Ci2i), VA Palo Alto HCS

81 Development of a Novel Emergency Department Quality Measure to Reduce Very Low-Risk Syncope Hospitalizations
Janke, A, Yale/Michigan

89 A Qualitative Study of the Implementation of a California State Mandate on Discharge Processes for Patients Experiencing Homelessness
Aridomi, H, University of California, San Francisco

122 Number of Acute Care Beds is Not a Reliable Predictor of Emergency Department Volumes in Small Rural/Critical Access Hospitals.
Findley, S, West Virginia University

133 Rates and Predictors of Emergency Department Mis-Triage: A Multiyear, Multicenter Study
Sax, D, The Permanente Medical Group

136 Ambulatory Follow-up After Emergency Department Discharge and Association With Outcomes Among Older Adults With Alzheimer's Disease and Related Dementia
Lin, M, Stanford University

RF36 Abstract Session: Infectious Diseases (COVID-19)

Room 306

82 Beyond the Breaking Point: Hospital Occupancy and Emergency Department Boarding During COVID-19
Janke, A,University of Michigan

105 Mortality of Trauma Patients With COVID-19
Lancaster, G, UnityPoint Health, University of Iowa Hospitals and Clinics

155 Assessment of Bystander Cardiopulmonary Resuscitation Comfort Level in Out-of-Hospital Cardiac Arrests Amidst an Ongoing Pandemic
Thai, A, Case Western Reserve University- School of Medicine

206 Children Under 12 Presenting to the Emergency Department With Covid-19
Collier C, Ascension Resurrection Chicago

278 Dissemination of Information About Ivermectin on Twitter During the COVID-19 Public Health Emergency
Ahluwalia, S, RAND Corporation

SUNDAY, OCTOBER 2, 2022 —*cont'd*

286 Trends in Trauma Admissions and Severity at a Level II Trauma Center During the COVID-19 Pandemic
Hartman, R, Mount Carmel Health System

RF37 Abstract Session: Resuscitation / Critical Care/ EMS

Room 305/309

86 Short-Term Outcomes and Patient Perceptions after EMS Non-Transport During the COVID-19 Pandemic
Toy, J, Harbor-UCLA Medical Center, Department of Emergency Medicine

92 Burn Injury Assessment Study: How Good Are We at Assessing Burn Injury?
Carter, J, Louisiana State University Health Sciences Center

184EMF Implementation of a Novel Fluid Resuscitation Device for the Care of Sepsis Patients: Processes and Perceptions in the Out-of-Hospital Setting
Cyr, J, University of North Carolina

198 Rapid Resuscitation for Hemorrhagic Shock: Hemodynamically Unstable Patients May Do Better Than Those Presenting With Normal Vitals
De Maio, V, University of North Carolina at Chapel Hill

212 Wait, What? Oral Midodrine Instead Of Pressors For Septic Shock?
Puissant, M, Maine Medical Center

406EMF Early Fluid Delivery by Emergency Medical Services for Sepsis Using a Novel Rapid Infusion Device
Patel, M, University of North Carolina at Chapel Hill

RF38 Abstract Session: Neurology

Room 310/311

134 Diagnostic Accuracy of the Physical Exam in Patients With Vertigo or Dizziness Presenting to the Emergency Department: A Systematic Review and Meta Analysis Supporting the Guidelines for Reasonable and Appropriate Care in Emergency Medicine
Khoujah, D, University of Maryland School of Medicine

215 Fixed-Dose vs. Weight-Based 4-factor Prothrombin Complex Concentrate Dosing for Reversal of Warfarin-Induced Intracranial Hemorrhage
Pop, M, University of Illinois Chicago College of Pharmacy-Rockford

227 Canalith Repositioning Maneuvers (CRM) for Benign Paroxysmal Positional Vertigo (BPPV): A Synthesis of Systematic Reviews
Khoujah, D, University of Maryland School of Medicine

236 Delta National Institutes of Health Stroke Scale After Alteplase for Acute Ischemic Stroke
Alorda, A, UCF/HCA GME consortium of greater orlando

292 Spanish Versus English Language Use of Stroke Evaluation Process
Diercks, L, UT Southwestern, Dallas, TX

321 Not So Benign Paroxysmal Positional Vertigo in the Emergency Department
Moaddel, V, Michigan State University College of Human Medicine, Grand Rapids, MI

RF39 EMF and Awards Showcase

Room 307/308

1:00 pm – 2:00 pm

RF40 State-of-the-Art II: Healthcare Workforce

Room 312/313/314

2:00 pm – 3:00 pm

RF41 Plenary II: New and Noteworthy

Room 312/313/324

4 COVID-19 Vaccine Messaging Platforms Increase Vaccine Acceptance and Uptake in Unvaccinated Emergency Department Patients: A Cluster Randomized Controlled Trial
Rodriguez, R, UCSF School of Medicine

7EMF Racial Residential Segregation and Long-term Outcomes Among Medicare Beneficiaries After Out-of-Hospital Cardiac Arrest
Abbott, E, Icahn School of Medicine at Mount Sinai

10 Emergency Department Boarding is Associated With Lower Profit Margins in Higher Performing Hospitals
Oz, N, Warren Alpert Medical School of Brown University

14 The Impact of a Mixed Fast-Track and Mid-Acuity Track Area With a Vertical Component on Emergency Department Throughput
Muradian, M, Beaumont Health

15 Facilitating Emergency Department Research on Older Adults Through Creation of a Research Data Warehouse
Brady, E, West Health Institute

17 Saline Versus Plasma Solution-A in Initial Resuscitation of Patients With Out-of-Hospital Cardiac Arrest: A Randomized Clinical Trial
Woo, J, Gachon University College of Medicine, Gil Medical Center

RF42 Abstract Session: Pain Management

Room 306

36 Stop the Vomit: Haloperidol as a Superior First-line Antiemetic
Godfrey, S, Western Michigan University SOM

129 Establishing an Outpatient Rapid Assessment Service for Patients With Suspected Malignancies
Vaswani, S, Columbia University

293 Return Rates for Opioid Versus Non-Opioid Management of Abdominal Pain in the Emergency Department
Ginsberg, Z, Mayo Clinic Alix School of Medicine

320 Trends in Acute Care of Vaso-Occlusive Episodes in the Emergency Department Following the 2014 National Heart Lung Blood Institute Guidelines
Ordonez, E, Baylor College of Medicine

409EMF Baseline Variation in Lung Point-of-Care Ultrasound Cohorts With COVID: Implications for Prognostication
Theodoro, D, Washington University School of Medicine

RF43 Abstract Session: Pediatrics

Room 305/309

94 Adolescents' Suicide Rates by Ethnicity: Data From the National Vital Statistics System 2015-2020
Howell, J, Inova Fairfax Medical Center

135 Impact of Race and Ethnicity on Cranial CT Use in Children With Minor Head Trauma
Atigapramoj, N, University of California, San Francisco

SUNDAY, OCTOBER 2, 2022 —*cont'd*

171 Presentations of Infants With Skull Fractures ≤ 3 Months of Age With and Without Intracranial Hemorrhage (ICH)
Kettler, E, Rady Children's Hospital - University of California Los Angeles

234 Utility of Shunt Series in the Evaluation of VP Shunt Dysfunction in Pediatrics
Chacko, J, UAMS

255 Delivery of Epinephrine by Metered-Dose Inhaler for the Treatment of Croup in Children
Kahne, K, Cohen Children's Medical Center

347 The Association of Environmental Factors on Emergency Pediatric Asthma-Related Healthcare Utilization
Zikry, H, Icahn School of Medicine at Mount Sinai

RF44 Abstract Session: Wellness / Education /Public Health

Room 310/311

118 Wilderness Medicine Curricula In Non-Physician Training Programs
Holstrom-Mercader, M, Penn State Hershey Medical Center

140 Factors Influencing Emergency Medical Services Burnout
Antol, R, John Peter Smith Hospital

221 Impact of the COVID Pandemic on Emergency Medicine Physician Wellbeing and Burnout: A 2-Year Longitudinal Study
Welch, J, Indiana University School of Medicine

271 Association Between Extreme Crowding and Wellness on Shift in a Pediatric Emergency Department
Welch, J, Indiana University School of Medicine

272 An Approach to Point-of-Care Ultrasound Training in a Teaching Hospital in The Gambia
Shindruk, A, UC Davis

325 Bridging the Gap: Medical Interpreter Utilization Workshop to Improve Communication
Adesina, A, Baylor College of Medicine

RF45 Abstract Session: Quality Improvement/Patient Safety

Room 307/308

53 Multicenter Test of the Emergency Department Trigger Tool: Site Differences in Adverse Events Detected
Griffey, R, Washington University in St. Louis School of Medicine

123 Reducing ED Back Pain Bounce-Back Proportion: Prescribing Physical Therapy
Kotob, A, University of Iowa Hospital & Clinics

192 Using the Electronic Health Record to Identify Patients Presenting to the Emergency Department at Highest Risk for Subsequent Overdose
Reed, E, The MetroHealth System, Case Western Reserve University School of Medicine

213 Development of a Quality Scorecard for Mobile Integrated Health
Sergi, F, University of California, San Francisco

295 Updating Patient Care: Where Do We Begin
Aldalati, A, Mayo Clinic

411[EMF] Measurement of Cost of Boarding Code Stroke Patients in the Emergency Department Using Time-Driven Activity-Based Costing
Canellas, M, University of Massachusetts Medical School

3:00 pm – 4:00 pm

RF46 Abstract Session: Resuscitation/Critical Care

Room 312/313/324

68 Extracorporeal Membrane Oxygenation for Cardiac Arrest: Does Age Matter?
Stephens, K, University of New Mexico

167 Predictors of Sustained ROSC and Good Neurologic Outcome After PEA Arrest
Stead, T, Trinity Preparatory School

241 Multicenter Prospective Evaluation of Out-of-Hospital Cardiac Arrest Patients Using Transesophageal Echocardiography: A Preliminary Analysis from The Resuscitative TEE Collaborative Registry
Teran, T, Weill Cornell Medicine

267 Throwing the Baby Out With the Ice Water? Dramatic Decreases in Targeted Temperature Management for Out-of-Hospital Cardiac Arrest
Slattery, D, Kirk Kerkorian School of Medicine at UNLV

337 Association of Serum Magnesium Level at Emergency Department Arrival and Favorable Neurologic Outcome for Out-of-Hospital Cardiac Arrest
Jong-Hak, P, Korea University Ansan Hospital

339 Relationships of Jugular Bulb Parameters Used as Indicators of Cerebral Perfusion and Metabolism With Cerebral Perfusion and Metabolism After Resuscitation from Cardiac Arrest: A Post-Hoc Analysis of Experimental Studies Using a Minipig Model
Jeung, KW, Chonnam National University Hospital

RF47 Abstract Session: Social Determinants of Health

Room 306

72 Association of Limited English Proficiency and Increased Emergency Department Waiting Room Lengths of Stay
Lim, T, Mayo Clinic

79 Association of Limited English Proficiency and Irregular Emergency Department Departures and Return Visits
Bower, S, Mayo Clinic

120 Inclusion of Non-English Language Preference Patients in Trauma and Emergency Medicine Related Motor Vehicle Collision Research
Leff, R, Mayo Clinic

240 Emergency Department Patients Who Leave Prior To Being Seen: Demographics And Predisposing Factors
Lopez Ortiz, C, University of Central Florida

262 Developing Novel Tools for Clinicians to Discuss Immigration for Resource Referral in the Emergency Department
Garcia, L, University of California San Francisco

359 The Impact of an Experiential Social Medicine Curriculum in a County Emergency Medicine Residency Training Program: a Mixed Methods Study
Vongsachang, H, Los Angeles County + University of Southern California Medical Center

RF48 Abstract Session: Telemedicine/Informatics

Room 305/309

23 "Tele-observation": Evaluation of a Virtual Provider Program in an Emergency Department Observation Unit
Leibee, C, Johns Hopkins School of Medicine

SUNDAY, OCTOBER 2, 2022 —*cont'd*

24 Emergency Department Virtual Telehealth Rounding – A Strategy for a Pandemic and Beyond
Mullins, K, Orlando Health

67 Tele-Emergency Care May Improve Access to Emergency Care Resources While Reducing Need for In-Person Emergency Department Evaluation
Zhao, L, VA Greater Los Angeles Healthcare System

99 Who Reads Their Notes: Characteristics of Patients Viewing Notes in the Emergency Department Following an Open Notes Rollout
Ogan, S, UC San Diego Health

147 When, What and How Frequently Do Patients Electronically Access their Emergency Department Records after Discharge?
Killeen, J, University of California San Diego

356 Frequency, Test Characteristics, and Patient Demographics Associated with Lab and Imaging Results Viewed in the Emergency Department During Encounters
Kwan, B, UC San Diego Health

RF49 Abstract Session: Toxicology/Pharmacology

Room 310/311

73 Therapeutic Effects of Melittin against Acetaminophen-Induced Liver Injury in Mice
Kim, G, School of Medicine, Daegu Catholic University

91 The Promising Use of an Emergency Department Observation Unit to Manage Patients with Opioid Use Disorder
Tran, T, Rutgers University

106 Lipid Emulsion Therapy During Resuscitation of the Critically-Ill Poisoned Patient: A Prospective Cohort Study
Levine, M, UCLA

163 Caustic Ingestions: Acids Or Bases. Does It Matter?
Levine, M, UCLA

291 Caustic Ingestions: Does Intent Matter
Levine, M, UCLA

343[EMF] Identifying and Addressing Barriers to Emergency Department Buprenorphine Use Across a Healthcare System
Comstock, G, Rocky Mountain Poison and Drug Safety

RF50 Medical Student and Resident Awards Competition

Room 307/308

4:00 pm – 5:00 pm

RF51 Abstract Session: Trauma

Room 312/313/314

45 Association Between Compliance with an Organized State Burn Triage Center and Burn Outcomes
Louisiana State University Health Sciences Center, New Orleans

268 Axillary Use Of Three Junctional Tourniquet Devices In Human Volunteers
Thompson, C, Navy Medical Center Portsmouth

283 Trauma Team Activation Fees Vary Widely Based on Region and Hospital Type
Pagano, K, Herbert Wertheim College of Medicine at Florida International University, Miami, FL, USA

303 Improving Obstetrical Trauma Care Using a Standardized Protocol
Ridley, J, The Chickasaw Nation

360 Pneumorachis and Pneumocephalus Following Penetrating Thoracic Trauma: A Case Report
Rangel, C, Kern Medical Center

362 Transferring Children with Pediatric Skull Fractures without Underlying Brain Injury: Is It Necessary?
Tun, K, Lincoln Medical Center, Bronx New York

RF52 Abstract Session: Ultrasound

Room 306

66 The Use of Additional Imaging Studies after Abnormal Biliary Point-of-Care Ultrasound in the Emergency Department
Fernandez, S, Mount Sinai Medical Center, Miami Beach, FL, USA

87 A Low-Cost Simulator For Ultrasound-Guided Retrograde Endovascular Balloon Occlusion Of The Aorta
Martinez, R, University of Miami/Jackson Memorial Hospital

97 RESCUE TEE Simulation Training: Evaluating the Learning Curve, Competence and Skill Retention of Emergency Physicians Following a 6-Hour RESCUE-TEE Simulator-based Training Workshop
Giorgetti, R, New York Presbyterian Brooklyn Methodist Hospital

190 Spontaneous Echo Contrast in Out-of-Hospital Cardiac Arrest. Measurement of Agreement and Incidence
Fox, E, Umass Memorial

284 Collaboration With a Bioengineering Senior Design Course to Develop A Novel Medical Device Facilitating Vessel Cannulation Under Continuous Ultrasound Guidance
Grzywinski, M, University of Michigan

351 The Accuracy of Handheld Ultrasound in the Evaluation of Symptomatic Pregnant Patients in the Emergency Department
Asikhia, O, Thomas Jefferson University Hospital

RF53 Abstract Session: Disaster Medicine/EMS

Room 305/309

52 Methodology for Measuring Health-Related Quality of Life Impact of Disasters
Neyman, G, Robert Wood Johnson Barnabas Health Community Medical Center

100 A Hybrid Management System for Pandemic Success: Application of the Incident Command and Lean Management Systems in San Francisco's Covid Response
Mercer, M, University of California San Francisco

179 Association Between Bystander Cardiopulmonary Resuscitation With and Without Public Access Defibrillator Use and Neurologic Outcomes After Out-of-Hospital Cardiac Arrest
Kim, S, Seoul National University Hospital

214 Characteristics of OHCA Survival and EMS Interaction During the COVID-19 Pandemic
Thompson, K, Rutgers Robert Wood Johnson Medical School

297 Creating a Framework for Mass Casualty Response Infrastructure
Mishra, D, New York Presbyterian Weill Cornell Medical Center

301 A Multi-Agency Description of Whole Blood Administrations by Emergency Medical Services During 9-1-1 Responses
Fernandez, A, ESO

SUNDAY, OCTOBER 2, 2022 —*cont'd*

RF54 Abstract Session: Health Care Policy/Health Services Research

Room 310/311

103 Level 4 and Level 5 Emergency Department Fees in Florida Vary Widely
Apicella, M, Mount Sinai Medical Center, Miami Beach, FL, USA

142 Emergency Department-Initiated Buprenorphine for Opioid Use Disorder: Impact on Patient Outcomes at a Community Hospital
Maguire, N, Rutgers Health/Community Medical Center

143 Understanding the Frequency of Emergency Department Utilization by Neurology Clinic Headache Patients Who Self-Report Visiting the Emergency Department for Headaches
Phelan, M, Cleveland Clinic

233 Characteristics of Leadership Communication Associated With Burnout and Teamwork Experience Among Emergency Department Staff During the COVID-19 Pandemic
Hayirli, T, Harvard University

269 Social Vulnerability Index Predicts Reduced Patient Portal Engagement During Emergency Department Visits
Turer, R, UT Southwestern Medical Center

410[EMF] Systematic Review of Recurrent Firearm Injury Rates in the United States
Mueller, K,Washington University in Saint Louis

9:00 – 10:00 AM

RF55 Abstract Session: Infectious Diseases (COVID-19)

48 COVID-19 and H1N1 Pneumonia: Reanalysis and Comparison of Two Cohorts
Sorice Correa, E, Faculdade de Medicina da Universidade de São Paulo

177 Impact of a Large Gathering on COVID-19 Transmission in a Community With Multiple Broad Mitigation Measures - New Orleans Louisiana, October 18, 2021 - November 11, 2021
St. Romain, M, LSU Emergency Medicine New Orleans

183 Evaluation of Increase in Thromboembolism During the COVID-19 Pandemic
Lord, S, University of Nebraska Medical Center (UNMC)

300 Understanding the Relationship of Key Demographic Indicators on COVID-19 Rates in Emergency Department Settings During Surges
Santodomingo, M, University of California San Diego

367 Utilizing Existing Infrastructure to Rapidly Create a Cost-effective BioBank during the COVID-19 Pandemic in a Southern Community Hospital
Santodomingo, M, University of California San Diego

370 Correlation Between the Electronic Frailty Index and Hospitalization Mortality in Older Adults Infected With SARS-CoV-2
Brooten, J, Atrium Health Wake Forest Baptist

RF56 Abstract Session: Infectious Diseases

Room 306

62[EMF] Metagenomic Analysis of the Urinary Microbiome Among Older Adult Emergency Department Patients With Suspected Urinary Tract Infection
Bradley, E, UMass Chan Medical School

63 Neuronal Death-Associated Proteins S100B, Tau and Neuron Specific Enolase Association to Sepsis-related Organ Dysfunction and Death in the Elderly: A Prospective Single Center Cohort Study
Vaisberg, V, Hospital das Clínicas da Faculdade de Medicina da USP

65 Missed Opportunities for Diagnosis of Human Immunodeficiency Virus within a Non-Risk Based Testing Strategy in Southern Health Systems Emergency Departments
Guess, S, Prisma Health - Upstate

149 Patterns of Fluoroquinolone Use in the Emergency Department 2009 – 2019
Pourmand, A, The George Washington University School of Medicine and Health Sciences

194 Discordance of Pneumonia Diagnoses from Admission to Discharge: A Retrospective Cohort Analysis of 118 Veterans Affairs Emergency Departments
Rutter, E, Salt Lake City VAMC

209[EMF] Combined Hepatitis B Virus and Hepatocellular Carcinoma Screening Using Point-of-Care Testing and Ultrasound in a Tanzanian Emergency Department: A Preliminary Report
Ford, J, University of California, San Francisco

RF57 Abstract Session: Public Health/Injury/Illness Prevention

Room 305/309

64 Impact of Substance Use Navigators on Addiction Treatment and Outcomes for Emergency Department Patients in an Integrated Public Health System
Schwimmer, H, Alameda Health System - Highland Hospital

168 Impact of Connecticut's Good Samaritan Laws in Preventing Opioid Overdose Deaths – An Applied System Dynamics Approach
Ali, S, Yale School of Medicine

264 Did COVID-19 Mitigation Effect the Accessibility and Usage of Emergency Department Based Programs to Combat Opioid Use Disorder?
Oh, Y, The MetroHealth System, Case Western Reserve University School of Medicine

273 Use of an Electronic Medical Record Flag to Reconnect With Patients Lost to Follow-Up in a Hepatitis C Virus Screening Program
Loszewski, C, Henry Ford Hospital

298 Evaluation of a Multi-Pronged Emergency Department-Based Approach to Reduce Subsequent Overdoses in a High-Risk Emergency Department Population of Opioid Users
Papp, J, The MetroHealth System, Case Western Reserve University School of Medicine

299[EMF] Community Outreach for Patient Engagement: A Randomized Controlled Trial Using Implementation Framework
King, R, Larner College of Medicine, UVM

RF58 Abstract Session: Quality Improvement/Patient Safety

Room 310/311

107 Systematic Review of Ionizing Radiation Dose Exposure for Commonly Performed Chest Imaging Techniques in the Emergency Department Setting
Zappacosta, H, UCLA

164 The Impact of Hallway Placement on Emergency Department Operations for Discharged Patients With Abdominal Pain
Sangal, R, Yale University

270 Code De-Escalation: Effectiveness and Feasibility Pilot Study of Intervention to Decrease Restraint Use and Health Inequities in Agitation Management in a Community Hospital Emergency Department
Bukhman, A, Brigham and Women's Faulkner Hosptial

SUNDAY, OCTOBER 2, 2022 —*cont'd*

289 Impact of an Emergency Department Quality Improvement Initiative to Promote Safe Discharge of Low-Risk Chest Pain Patients
Busman, M, Michigan Emergency Department Improvement Collaborative; Emergency Care Specialists, Grand Rapids, Michigan

350 Emergency Department-Based Magnetic Resonance Imaging Utilization and Operational Impact in a Rural Academic Medical Center: A Single-Center, Retrospective, Observational Study
Fjeld, K, Dartmouth-Hitchcock Medical Center

364 A Dangerous Case of the "Goldilocks Effect": Experimental Demonstration of Potential Vascular Injury Mechanism With Central Venous Catheter Insertion
Broder, J, Duke University School of Medicine, Durham, NC, USA

RF59 Abstract Session: Resuscitation/Critical Care

Room 307/38

104 Emergency Department Implementation of a Two Bag Diabetic Ketoacidosis Protocol Decreases Time to Resolution: A Retrospective Single Center Analysis
Gilchrist, H, Dartmouth-Hitchcock Medical Center

137 Does Boarding Time in the Emergency Department Contribute to Mortality Among Those who are Mechanically Ventilated?
Johnson, A, UC San Diego

207 Outcomes of Patients With Septic Shock in an Emergency Department-Based Intensive Care Unit
Perez, S, University of Michigan

249 Differences in Emergency Department Sepsis Care: Do Race, Sex, and Language Matter?
Nacier, C, Alpert Medical School of Brown University

302 Data or Dogma: Initial Potassium Levels in Patients Presenting to the Emergency Department in Diabetic Ketoacidosis
Melville, L, New York Presbyterian-Brooklyn Methodist Hospital

336 Impact of Emergency Department-based Intensive Care Unit on Outcomes of Decompensating Boarding Patients in the Emergency Department
Doan, J, University of Michigan

10:00 am – 11:00 am

RF60 Prime Time

Room 312/313/314

RF61 Abstract Session: Toxicology/Pharmacology

Room 306

119 Cannabis-induced Anxiety Disorder In the Emergency Department
Keung, M, Michigan State University College of Human Medicine; Grand Rapids, MI

259 Outcomes and Resource Utilization of Patients Presenting to the Emergency Department With Opioid and Benzodiazepine Poisoning
Ramdin, C, Rutgers New Jersey Medical School

266 The Importance of Opioid and Naloxone Education in the Emergency Department for High-Risk Age Groups
Steenblik, J, University of Utah

296 US National Trend of Cyclobenzaprine Use in Emergency Departments 2007-2019
Pourmand, A, The George Washington University School of Medicine and Health Sciences

318 How are Research Associate Programs Structured? The First Updated, Cross-Sectional Survey of Programs Across the US and Canada
Samaha, H, Trinity Health - Livonia, Michigan

326 Phenobarbital vs Benzodiazepines for Treatment of Alcohol Withdrawal in the Emergency Department: A Systematic Review and Meta-Analysis
Lee, C, Highland Hospital

RF62 Abstract Session: Trauma

Room 305/309

20 Outcome Study of Mild Traumatic Brain Injury Patients Integrating a Brain Electrical Activity-Based Decision Rule
Miller, J, Henry Ford Health

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From the American College of Emergency Physicians
2022 Research Forum
October 1-4, 2022
San Francisco, CA

The following abstracts were presented virtually at *ACEP22 Unconventional*:
54, 172, 327, 354, 366, 372, 376, 377 378, 379, 380, 381, 383, 384, 385, 386, 387, 388, 389, 392, 395, 397, 399, 400

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151, 204, 218, 225 EMF, 243, 334, 373, 375, 390, 391, 393, 394, 396, 401, 402

1 Reversing miRNA-Suppressed Cardioprotective Cardiokine Expression as a Novel Intervention Against Sleep Breathing Disorders-Exacerbated Post-MI Remodeling

Du Y, Christopher T, Lopez B, Lau W, Wang Y, Ma X/Thomas Jefferson University, Philadelphia, Pennsylvania, US

Rationale: Cardiovascular disease remains a leading cause of morbidity and mortality worldwide. Although technological and pharmaceutical advances have enhanced patient survival post-acute myocardial infarction (MI), both incidence and prevalence of post-MI leading to heart failure (HF) have continually climbed. Accordingly, it is important to identify treatable conditions potentially contributive to HF progression**.** Obstructive sleep apnea (OSA), a sleep breathing disorder in which chronic intermittent hypoxia (CIH) is the primary pathology, is associated with multiple cardiovascular diseases. However, whether and how CIH may affect cardiac remodeling following myocardial infarction (MI) remains unknown.

Objective: To determine whether CIH exposure at different periods of MI may exacerbate post-MI heart failure and to identify the mechanisms underlying CIH-exacerbated post-MI remodeling.

Methods and Results: Adult male mice were subjected to MI (LAD ligation for 4 weeks) with and without CIH (4 or 8 weeks). CIH prior to MI (CIH+MI) had no significant effect on post-MI remodeling. However, double CIH exposure (prior to plus post-MI, CIH+MI+CIH), an animal model most relevant to MI patients with OSA, markedly exacerbated post-MI remodeling and HF. Compared to MI without CIH, left ventricular (LV) ejection fraction and fractional shortening were reduced, heart weight/body weight ratio was increased, and LVmass, LV diastolic volume, and LV internal diameter were increased in the CIH+MI+CIH group ($P<0.01$). Most interestingly, CIH exposure only during the post-MI period (MI+CIH) exacerbated pathological remodeling and HF to a comparable extent as that observed in CIH+MI+CIH animals, suggesting that CIH exposure during the MI period is a significant pathogenic factor increasing ischemic injury and pathologic remodeling. Mechanistically, CIH activated TGF-b/Smad signaling and enhanced cardiac epithelial to mesenchymal transition, markedly increasing post-MI cardiac fibrosis. Transcriptome analysis revealed that among 15 genes significantly downregulated (MI+CIH versus MI), *Ctrp9* (a novel cardioprotective cardiokine) was one of the most significantly inhibited genes. Rt-PCR/Western analysis confirmed that cardiomyocyte *Ctrp9* expression was significantly reduced in MI+CIH mice. RNA-seq, Rt-PCR, and dual-luciferase reporter assays identified that miR-214-3p is a novel *Ctrp9* targeting miRNA. miR-214-3p expression was significantly upregulated and responsible for *Ctrp9* gene suppression in MI+CIH. Finally, AAV9-mediated cardiac-specific *Ctrp9* overexpression or rCTRP9 administration inhibited TGF-b/Smad and Wnt/β-catenin pathways, attenuated interstitial fibrosis, improved cardiac function, and enhanced survival rate in MI+CIH animals.

Conclusions: This study provides the first evidence that MI+CIH upregulates miR-214-3p, suppresses cardiac CTRP9 expression, and exacerbates cardiac remodeling, suggesting that CTRP9 may be a novel therapeutic target against pathologic remodeling in MI patients with OSA.

No, authors do not have interests to disclose

2 Dexmedetomidine Sublingual Film for Acute Agitation in Schizophrenia or Bipolar Disorder by Baseline Clinical Global Impression-Severity of Agitation

Citrome L, Preskorn S, Watson C, Rajachandran L, Risinger R/New York Medical College, Valhalla, New York, US

Objectives: Dexmedetomidine sublingual film (SF) is a self-administered treatment for acute agitation in patients with schizophrenia (SCZ) or bipolar disorder (BPD). Dexmedetomidine is a selective agonist of alpha-2 adrenergic receptors. A post hoc analysis of pooled Phase 3 clinical trial data investigated the efficacy of dexmedetomidine SF by baseline agitation severity as measured by the clinical global impression- severity (CGI-S) scale.

Design/Methods: Two similarly designed, randomized, double-blind, placebo-controlled Phase 3 trials of dexmedetomidine sublingual film (180 mcg or 120 mcg) were conducted in participants aged 18-75 with acute agitation and either SCZ or BPD. Acute agitation was defined as a total score $^{3}14$ on the Positive and Negative Syndrome Scale (PANSS)-Excited Component (PEC) scale and ^{3} 4 on at least 1 of the 5 PEC items (poor impulse control, tension, hostility, uncooperativeness, excitement).

The primary endpoint was change from baseline in PEC total at 2h. The secondary endpoint was earliest time of a statistically significant separation from placebo. Severity of agitation at baseline was assessed by the CGI-S scale at Screening and immediately prior to dosing. The CGI-S was focused on the severity of agitation rather than the severity of the overall illness.

Results: 760 patients enrolled in the 2 trials. All doses of dexmedetomidine SF met the primary endpoint of statistically significant change from baseline in PEC total at 2h vs placebo (P<.001). Mean (SD) reductions in PEC total at 2h were -10.4 (4.4), -8.7 (5.0), and -4.8 (4.7) for 180 mcg, 120 mcg, and placebo, respectively. Statistically significant separation from placebo occurred as early as 10 minutes at 180 mcg (P=.004) and 20 minutes at 120 mcg (P=.015).

The PEC total score and PEC change from baseline were stratified by baseline CGI-S score, mild (2-3), moderate (4), and severe (5-6). Mean (SD) 2-hour PEC total scores for 180 mcg were 5.5 (1.3), 7.5 (3.4), and 8.2 (4.8), for 120 mcg were 7.6 (3.9), 8.8 (4.2), 10.2 (5.7), and for placebo groups were 8.4 (3.6), 12.7 (4.6), and 16.2 (5.4) for those with baseline mild, moderate, and severe CGI-S scores, respectively. Least squares mean difference from placebo for 180 mcg were -3.1 (0.8), -5.0 (0.4), and -8.2 (1.1) (all *P<.001)* and for 120 mcg were -0.7 (0.9; *P=.45)*, -3.9 (0.4; *P<.001*),-6.2 (1.1; *P<.001*) for those with mild, moderate, and severe CGI-S scores, respectively.

There were no drug-related serious or severe AEs in either trial. No participant was unarousable either by AE reporting or by the Agitation and Calmness Evaluation Scale (ACES). The most common treatment emergent adverse events (TEAEs) were somnolence (21.5%), dry mouth (5.9%), hypotension (5.3%), dizziness (4.9%), orthostatic hypotension (4.0%), oral hypoesthesia (3.8%), and headache (3.6%). Of 110 somnolence reports, 86% were mild and 14% moderate.

Conclusions: Dexmedetomidine sublingual film treated acute agitation associated with SCZ or BPD, with an onset of action as early as 10 minutes at 180 mcg and was well tolerated with somnolence the most common AE. Dexmedetomidine provides a novel mechanism of action, making it a potential addition to noninvasive treatments for acute agitation.

Yes, authors have interests to disclose
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Disclosure: BioXcel Therapeutics
Employee
BioXcel Therapeutics
Disclosure: BioXcel Therapeutics
Employee
BioXcel Therapeutics

3 Clinical Confirmation of Improved Likelihood of Survival Associated With the Use of the Head-Up CPR Bundle for Non-Shockable Cardiac Arrest Presentations

Pepe P, Moore J, Bachista K, Debaty G, Lurie K, Salverda B, Emanuelson L, Parquette B, Quinn R, Labarère J, Lick C/University of Texas Health Sciences Center, Houston, Houston, Texas, US

Study Objectives: The modified physiological approach to CPR that uses gradual automated head- up/torso-up positioning (AHUP) with concurrent application of other CPR adjuncts designed to augment circulation and lower intracranial pressure has consistently facilitated normalized cerebral perfusion pressures and neuro-intact survival pre-clinically (eg, *Resuscitation* 2021;158:220) and is also associated with markedly improved odds of survival for out-of-hospital cardiac arrest (OHCA) patients in early clinical evaluations (eg, *Crit Care Med* 2022:50[suppl1]:1). Similar to automated defibrillators (AEDs) in shockable cases, the sooner AHUP is applied, the better the outcome. Accordingly, given that >80% of OHCA cases are those with *non-shockable* presentations (NS-OHCA) that predict an extremely poor outcome with unlikely chances of successful survival to hospital discharge (SURV), the specific aims here were to: 1) confirm if the overall association of improved SURV seen with AHUP CPR (compared to conventional CPR [C-CPR]) also carries into the subgroup of NS-OHCA cases; and 2) confirm if time elapsed from 9-1-1 call receipt to AHUP initiation ($T_{911\text{-AHUP CPR}}$) is also associated with higher SURV in NS-OHCA cases.

Methods: Prospectively-collected data were obtained from a national AHUP CPR registry in which 5 early-adopting EMS agencies routinely tracked OHCA SURV, $T_{911\text{-AHUP CPR}}$ and used basic 1st responders for faster AHUP initiation. In all cases, AHUP was combined with manual (or automated) active compression-decompression and impedance threshold devices (all FDA-cleared). AHUP devices steadily elevate the head/torso during CPR over several minutes (occiput reaching 22 cm). For the most rigorous comparison, C-CPR controls were purposely derived from 2 large-scale published NIH-funded trials involving >10,000 OHCA patients studied in high-performance EMS systems including those that closely monitored, recorded and reported quality of CPR for study inclusion. Overall comparisons of SURV between AUHP and control groups were calculated using Fisher's exact tests. In additional analyses, AHUP and C- CPR cases were also matched for $T_{911\text{-EMS CPR}}$ (time from 9-1-1 call receipt to start of 1st responder CPR) when assessing the relationship between start of AHUP CPR and SURV. P-values <0.05 were considered statistically significant.

Results: Most patients did have asystole presentations (61.2% [248/405 AHUP] and 61.3% [1,159/1,892 controls]; p=1.0). Overall, AHUP CPR for NS-OHCA patients was associated with a 2.4-fold increase in SURV compared with C-CPR counterparts from the high-performance / highly-monitored systems (7.9% [32/405] vs 3.3% [63/1,892]; p=0.0001). When matched for $T_{911\text{-EMS CPR}}$ and then assessed according to $T_{911\text{-AHUP CPR}}$, associated SURV advantages with AHUP CPR (vs C-CPR) became progressively higher with shorter $T_{911\text{-AHUP CPR}}$. When $T_{911\text{-AHUP CPR}}$ was <12 mins, SURV was 10.8% (23/213) vs 3.2% (54/1709) for C-CPR (p=0.0001) and if <10 mins, SURV was 12.2% (15/123) vs 3.5% (42/1199); p=0.0001. Relevant to these findings, median $T_{911\text{-EMS CPR}}$ for both AHUP and C-CPR control groups was 8 mins and the median $T_{911\text{-AHUP}}$ was 11 mins.

Conclusions: For the great majority of OHCA patients who have non-shockable presentations, AHUP CPR was associated with markedly improved odds of survival vs. C-CPR. Moreover, shorter times to AHUP CPR initiation augmented survival chances and did so within very achievable response intervals.

Yes, authors have interests to disclose
Disclosure: Advanced CPR Solutions
Board Member/Officer/Trustee Advanced CPR Solutions

4 COVID-19 Vaccine Messaging Platforms Increase Vaccine Acceptance and Uptake in Unvaccinated Emergency Department Patients: A Cluster Randomized Controlled Trial

Rodriguez R, Nichol G, Eucker S, Chang AM, Arreguin M, Morse D, Shughart L, Pauley A, Eswaran V, O'Laughlin K, Chavez CL/UCSF School of Medicine, San Francisco, California, US

Background and Objective: Vulnerable patients whose primary access to care occurs in emergency departments (EDs) have suffered high morbidity and mortality during the COVID-19 pandemic; yet, they are disproportionately hesitant to receive COVID-19 vaccines. We sought to determine whether provision of COVID-19 vaccine messaging platforms, which were developed via in-depth interviews and qualitative analysis of vaccine hesitant ED patients, results in greater COVID-19 vaccine acceptance and uptake in unvaccinated ED patients. Herein, we present the findings of our first formal analysis of our trial.

Methods: This prospective, cluster randomized controlled trial (unit of randomization = one week) includes alert, non-critically ill, adult (> 17 years) patients who have not received a COVID-19 vaccine at seven hospital EDs in four US cities. The intervention is delivery of three COVID-19 vaccine messaging platforms (an English or Spanish 4-minute video, a 1-page informational flyer and a brief, scripted message delivered by an ED physician or nurse) during ED waiting times. Our primary outcomes are survey responses to "*Would you accept the COVID vaccine in the emergency department today if your doctor asked you?*" and receipt of a COVID-19 vaccine within 32 days ascertained in a blinded manner by electronic health record review and telephone follow-up.

Results: Of 630 eligible patients screened from12/6/21 to 4/7/22, 333 (52.9%) agreed to participate (156 during intervention weeks, 177 during control weeks). Intervention and Control groups were similar in terms of their baseline characteristics - See Table. More intervention group patients stated they would accept a COVID-19 vaccine in the ED if offered (43 [28%] vs 20 [11%]: difference in proportions =16%, 95% confidence interval [CI] 8 to 25%; number needed to treat [NNT] = 6). More intervention group patients received a COVID-19 vaccine at 32 days after their ED visit (35 [22%] vs 9 [3%]; difference in proportions =17%, 95% CI 10 to 25%; NNT = 6).

Conclusions: With a low NNT, implementation of COVID-19 vaccine messaging platforms in EDs leads to greater COVID-19 vaccine acceptance and uptake in unvaccinated ED populations. This ongoing trial may pave the way for the broad

delivery of COVID-19 (and other vaccine) messaging to improve vaccine acceptance and uptake in vulnerable ED populations nationally.

Table: Participant Characteristics

	All (333)	Intervention (156)	Control (177)
Median age in years, (IQR)	39 (30, 53)	38 (31, 52)	39 (28, 54)
Female gender	140 (42%)	62 (40%)	78 (44%)
African American	133 (40%)	58 (37%)	75 (42%)
Latinx	60 (18%)	30 (19%)	30 (17%)
White, non-Latinx	121 (36%)	56 (36%)	65 (37%)
No primary care	148 (44%)	73 (47%)	75 (42%)

Yes, authors have interests to disclose

Disclosure: This study was funded by NIH (NIAID) Grant R01 AI166967-01 PROmotion of COvid-19 VA(X)ccination in the Emergency Department – PROCOVAXED

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This study was funded by NIH (NIAID) Grant R01 AI166967-01 PROmotion of COvid-19 VA(X)ccination in the Emergency Department – PROCOVAXED

EMF

5 Frequency of Tick-borne Coinfections in Children With Suspected Lyme Disease

Nigrovic LE, Neville D, Chapman L, Kharbanda A, Balamuth F, Levas M, Thompson A, Gerstbrein D, Buchan B/Boston Children's Hospital, Boston, Massachusetts, US

Introduction: In endemic regions, *Ioxodes* species ticks can transmit *Borrelia* species as well as other tick- borne pathogens. The frequency of tick-borne infections and co-infections in children with suspected Lyme disease is poorly characterized due to shortcomings of current microscopy and serologic diagnostic methods. Importantly, this creates clinical uncertainty about the optimal approach to diagnosis and management of suspected tick-borne infections in children.

Methods: We performed a prospective eight-center study of children 1 to 21 years of age presenting to a Pedi Lyme Net emergency department for evaluation for Lyme disease between June 2015 and December 2021. We defined a case of confirmed Lyme disease based on presence of erythema migrans (EM) lesion or positive two-tier serology in the appropriate clinical context. For this study, we selected Lyme cases with either a single EM lesion or neurologic Lyme disease (facial palsy and/or meningitis) matched by age, sex and clinical center to clinical mimics (ie children with facial palsy or meningitis but negative two-tier Lyme disease serology). We also included children with a recent tick bite without symptoms of tick-borne infection. Using bio-banked whole blood research samples, we performed a research multiplex high definition polymerase chain reaction (HDPCR) panel (ChromaCode, Carlsbad, CA) to test for 8 bacterial and 1 protozoan tick-borne pathogens. We report the frequency of tick-borne co-infections in children with Lyme disease and matched clinical mimics.

Results: Of the 617 study patients, 306 (49.6%) had a single EM lesion or neurologic Lyme disease, 302 (48.9%) clinical mimics and 9 (1.5%) had a recent tick bite without evidence of infection. The median patient age was 10 years (interquartile range 6-14 years) and 370 (59.9%) were male. To date, we have run 183 multiplex PCR panels of which 4 (2.2%) failed sample quality checks. Of the 179 completed multiplex PCR panels to date, 6 children with early neurologic Lyme disease had a previously unknown tick-borne pathogen identified using the HDPCR panel (2 *Anaplasma phagocytophilum* and *4 Babesia microti)* and 1 had *B. burgordferi*/*B. mayonii* detected. Tick-borne coinfections were identified more frequently in children with confirmed Lyme disease (7.1% Lyme disease vs. 0% clinical mimics; p=0.07). Clinically, all 4 with *Babesia* spp. and 1 with *A. phagocytophilum* were treated with antibiotics ineffective for this coinfection.

Conclusion: A significant minority of children with suspected Lyme disease also had other tick-borne infections identified by multiplex HDPCR panel. Reliance on traditional diagnostic methods and clinical presentation my underdiagnose or misdiagnose these infections leading to ineffective antibiotic therapy. Further study is needed to identify children at highest risk of tick borne co-infections to guide clinical decision-making.

No, authors do not have interests to disclose

6 Extended-release Naltrexone and Case Management for Treatment of Alcohol Used Disorder in the Emergency Department

Murphy C, Wang R, Montoy JC, Coralic Z, Ramirez B, Raven M/University of California San Francisco, San Francisco, California, US

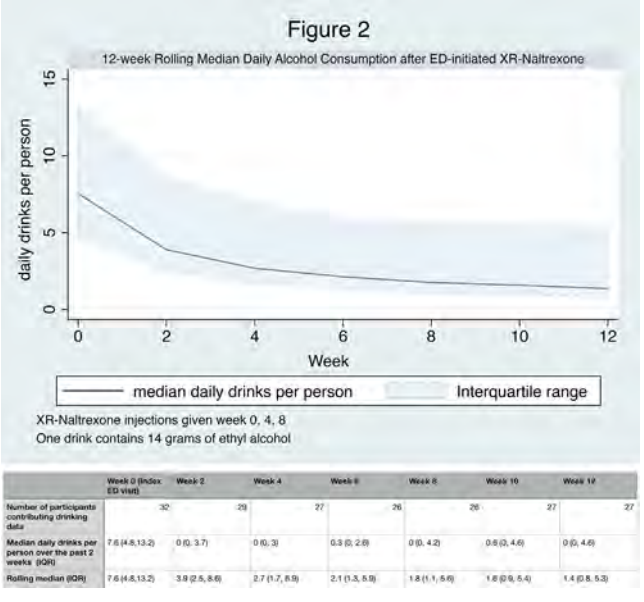
Objectives: Assess the feasibility of initiating treatment for alcohol use disorder with extended-release Naltrexone (XR-Naltrexone) and case management services in the emergency department (ED), and estimate the intervention's impact on daily alcohol consumption (DAC) and quality of life (QOL).

Design: This is a twelve week, prospective open-label single-arm study of a multimodal treatment for AUD consisting of monthly XR-naltrexone injections and case management services initiated at an single urban academic ED. Participants were actively drinking adult ED patients with known or suspected AUD and AUDIT-C score > 4. The main feasibility outcomes were the proportions of participants enrolled/approached, completed/enrolled, and continuing naltrexone after the trial/enrolled. Efficacy outcomes were the change in DAC (drinks/day, 14g ethanol/drink) measured by 14-day timeline follow back, and the change in QOL measured with single-item Kemp QOL scale.

Results: 179 patients were approached and 32 enrolled (18%). 25/32 (78%) completed all visits, 22/32 (69%) continued naltrexone after the trial. Baseline DAC was 7.6 drinks/day (IQR 4.5, 13.4) and mean QOL 3.6 (SD 1.7) on a 7-point scale. After 12 weeks of treatment, median DAC change was -7.5 drinks/day (Hodges-Lehman 95% CI -8.6, -5.9). Mean QOL change was 1.2 points (95% CI 0.5, 1.9; P< 0.01).

Conclusions: We found initiation of treatment of AUD with XR-naltrexone and case management is feasible in an ED setting and observed significant reductions in drinking with improved quality of life in the short term. Multi-center RCTs are needed to further validate these findings.

Trial Registration: clinicaltrials.gov NCT04094584



	Week 0 (Index ED visit)	Week 2	Week 4	Week 6	Week 8	Week 10	Week 12
Number of participants contributing drinking data		32	29	27	26	26	27	27
Median daily drinks per person over the past 2 weeks (IQR)	7.6 (4.8,13.2)	0 (0, 3.7)	0 (0, 3)	0.3 (0, 2.6)	0 (0, 4.2)	0.6 (0, 4.6)	0 (0, 4.6)
Rolling median (IQR)	7.6 (4.8,13.2)	3.9 (2.5, 8.6)	2.7 (1.7, 8.3)	2.1 (1.3, 5.3)	1.8 (1.1, 5.6)	1.6 (0.9, 5.4)	1.4 (0.8, 5.3)

No, authors do not have interests to disclose

EMF 7 Racial Residential Segregation and Long-term Outcomes Among Medicare Beneficiaries After Out-of-Hospital Cardiac Arrest

Abbott E, Buckler D, Hsu J, Abella B, Carr B, Zebrowski A/Icahn School of Medicine at Mount Sinai, New York, New York, US

Introduction: Racial and ethnic disparities in incidence and survival to hospital discharge following out-of-hospital cardiac arrest (OHCA) exist in the US, but impact on long-term outcomes are less well understood. Racial residential segregation, a product of long-standing systemic and institutional racism, has been associated with worse outcomes for several health conditions, but has not been evaluated in OHCA. Our objective was to examine the association of the index of concentration at the extremes (ICE), a set of measures of residential segregation, with differences in long-term survival after OHCA.

Methods: Utilizing age-eligible Medicare fee-for-service claims data from 2013-2015, we identified OHCA claims with survival to discharge, using ICD-CM diagnosis codes. The primary predictors, ICE quintiles for race, income, and racialized income, were calculated at the beneficiary residential zip code level. Outcomes were survival at 1 and 3 years after discharge from index OHCA. All participants contributed a minimum of 3 years of follow-up before censoring. Random-effects Cox proportional hazard models were fitted with shared frailty to account for hospital level clustering and to examine the association of OHCA mortality and zip code level ICE measures.

Results: Of the 29,847 included claims, mean beneficiary age was 75 years (SD 8), 40.1% were female, 79% White, and 15.2% Black. The median follow-up time was 533 days (IQR 11.00, 1439.00). Overall survival for the cohort was 54% (n=16,129) at 1 year and 40.8% (n= 12,189) at 3 years. In fully adjusted models, we found a decreased hazard of death in beneficiaries residing in the most racially and economically privileged zip codes (Q5) compared to the least privileged areas (Q1) across all three ICE measures (race: HR:0.84; CI 0.79-0.88, income: HR 0.76; CI 0.73-0.81, racialized income: HR 0.78; CI 0.74-0.83). Among individual covariates, not receiving cardiac catheterization and ICD placement at the first treating hospital was strongly associated with increased hazard of death (HR 2.25; CI 2.16-2.35) and (HR 1.95; CI 1.8-2.1), respectively.

Conclusions: Among Medicare beneficiaries with OHCA, ICE measures of residential segregation are independently associated with increased hazard of death for those residing in the least privileged zip codes. More work is needed to identify methods to decrease disparities in OHCA outcomes in the context of racial and economic segregation.

No, authors do not have interests to disclose

8 Comparison of One-year Outcomes by Management Type in Patients Presenting to the Emergency Department With Uncomplicated Acute Appendicitis

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Objective: There are approximately 300,000 cases of acute appendicitis in the US annually. Laparoscopic appendectomy is currently the most widely preferred method for acute appendicitis. However, non-operative management for appendicitis has been cited as a viable alternative to appendectomy. Our objective was to compare ED patients with uncomplicated acute appendicitis who received appendectomy versus no surgery for one-year outcomes including surgery rates, ED revisits, repeat hospitalizations, and cost.

Methods: Using three linked state-wide databases from the Maryland Healthcare Cost and Utilization Project (HCUP), we identified patients with a primary diagnosis of uncomplicated acute appendicitis treated in a Maryland ED between 2016 and 2018. We measured the health care utilization for each patient in the Ambulatory Surgery, Inpatient, and ED settings for one year following the initial ED visit. We used Medicare Relative Value Units (RVUs) and HCUP Cost-Charge Ratio files to estimate direct costs. Finally, we performed a multivariate logistic regression analysis comparing patients who obtained appendectomy vs non-surgical management on initial visit.

Results: Of the 7744 patients analyzed in this study, 87% (N=6729) obtained an appendectomy on initial visit, while 13% (N=1015) received non-surgical management. There was no association between appendicitis management type and payer, race, ethnicity, or zip code stratified by income. Of those that obtained non-surgical management on initial visit, 27% (N=275) were admitted on initial visit and 14% (N=145) obtained an appendectomy within one year. One-year occurrences of new appendicitis complicated by perforation or abscess occurred at rates of less than one 1% for both groups. However, patients who obtained surgical management had lower ED revisits (11 vs 162 per 1000 patients), lower repeat hospitalizations (<1 vs 184 per 1000 patients), lower total hospital length of stay (1.92 vs 2.35 average days per year), and lower costs ($3789 vs $4996) at one year ($p < 0.0001$). Initial management with appendectomy was associated with increased age ($p < 0.0001$) and Charleson comorbidity index ($p < 0.05$), while non-surgical management was associated with appendicolith / bowel obstruction ($p < 0.0001$) as well as ischemic heart disease, hypertension, alcohol-related disorders, and diabetes mellitus.

Conclusions: ED patients with uncomplicated appendicitis who are treated with surgical management show fewer ED revisits, fewer repeat hospitalizations and decreased one-year cost but no change in risk of perforation or death compared to non-surgical management.

No, authors do not have interests to disclose

9 Nationwide Reimbursement Impact of COVID-19 to Emergency Physicians: $6.6 Billion Loss in 2020

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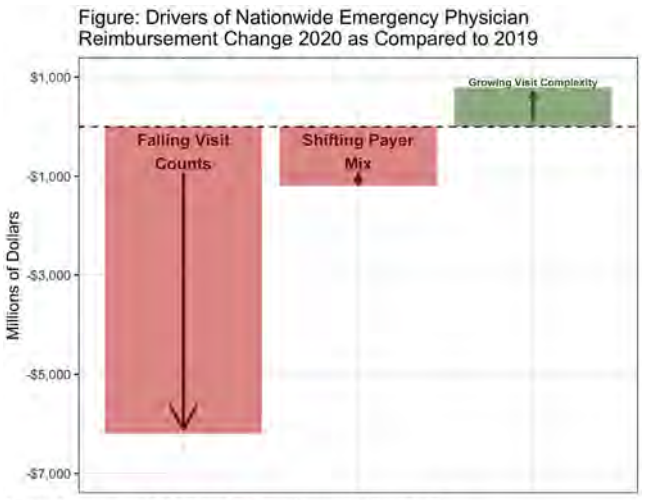
Study Objective: To estimate the nationwide impact of the COVID-19 pandemic on emergency physician reimbursement in 2020 as compared to 2019.

Methods: We conducted an observational analysis utilizing the American College of Emergency Physicians Clinical Emergency Data Registry (CEDR) and Nationwide Emergency Department Sample (NEDS). We calculated reimbursement for evaluation and management services in the CEDR between January 2019 and December 2020 based on level of service and insurance payer. To obtain reimbursement amounts, we combine manually-abstracted publicly reported fee schedules for Medicare and Medicaid with median in-network rates for private insurance available from FAIR Health. To derive national estimates, we matched emergency departments (EDs) in the 2019 NEDS to EDs in the CEDR. We characterize changes in visitation rates, level of service, and insurance payer, and estimate nationwide reimbursement in 2020 and 2019 to provide an estimate of reimbursement change associated with COVID-19.

Results: A total of 213 EDs and 12,591,513 ED visits were included from the CEDR. ED visit counts nadired to 60% of 2019 baseline in April 2020. Compared to 2019, visits in 2020 had a higher proportion of high complexity visits and Medicaid or Medicare visits. Total emergency physician reimbursement in 2020 was estimated to be $6.6 billion less than in 2019. Falling visit counts were most important in driving reimbursement losses, worsened by shifting payer mix and minimally attenuated by increasing visit complexity. If emergency physicians nationally had received the maximum relief allocated via the Coronavirus Aid, Relief, and Economic Security Act, this would only compensate 10.3% of the total reimbursement losses.

Conclusion: The COVID-19 pandemic led to a marked reduction in emergency physician reimbursement, driven primarily by lower volume and to a lesser degree by shifting payer mix. Despite the recognized need for emergency physicians to ensure front-line response to COVID-19 and ongoing disaster preparedness, policy efforts have not mitigated sharp reimbursement decreases, threatening the fragile economics of emergency care.



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Emergency Medicine Policy Institute
Disclosure: U.S. Acute Care Solutions
Employee
U.S. Acute Care Solutions

10 Emergency Department Boarding Is Associated With Lower Profit Margins in Higher Performing Hospitals

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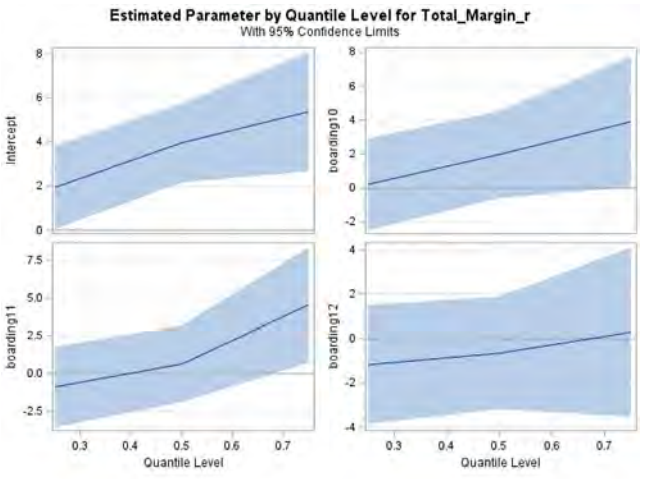
Background: Boarding of emergency department patients is associated with reductions in quality, safety, patient experience, and ED operational efficiency. However, ED boarding is ultimately reflective of inefficiencies in hospital capacity management. The most effective hospitals likely adapt and plan for variability in patient flow. Ultimately, the ability of a hospital to do so will impact its financial performance. While inefficient management of the inflow of patients may affect the financial performance of an institution, the relationship between boarding and hospital-wide financial performance remains ill-defined.

Objectives: We investigated the relationship between ED boarding and hospital financial measures of performance.

Methods: Cross-sectional ED operational data were collected from the ED Department Benchmarking Alliance (EDBA), a voluntarily self-reporting operational database including 54% of EDs nationwide. Free- standing and pediatric EDs and those with missing boarding data were excluded. The key operational outcome variable was quantile of median boarding time. Of these available non-profit institutions, we studied financial information by accessing their self-reported 990 forms. Specifically, we studied common measures of financial performance: Return on Equity (ROE), Total Margin (TM), Total Asset Turnover (TAT.), and Financial Leverage (FL). Associations were investigated using quantile regressions adding ED volume, ED admission percentage, urban versus non-urban ED site, trauma status, and percentage of population receiving Medicare and Medicaid as covariates in the regression models.

Results: Operational data and corresponding 990 forms were available for 127 EDs from 31 states for 2018. Median boarding time across EDs was 148 minutes (IQR: 100,216). When comparing financial measures relative to the effect on a national median boarding quartile, after adjusting for the covariates in the regression model, we found that for the top quantile of TM, for each quantile increase in boarding there was a significant negative effect of TM, specifically the mean TM for the top 25% decreases by 1.9% for every quantile increase in boarding ($p = 0.0003$). When boarding increases from a median of 67 minutes (bottom quantile) to 288 minutes (top quantile) there is a corresponding 5.7% decrease in TM from a mean of 15.2% for the top quartile of TM sites.

Conclusions: Using the largest available national registry of ED operational data, we found that a stepped increase in median boarding quartiles is negatively associated with the profitability of hospitals in the top quartile of financial performance.



Top left: Adjusted effect of bottom 25% median boarding across quartiles of TM

Bottom left: Adjusted effect of second quartile median boarding across quartiles of TM

Top right: Adjusted effect of third quantile median boarding across quartiles of TM

Bottom right: Adjusted effect of top quantile quartile median boarding across quartiles of TM

No, authors do not have interests to disclose

11 Implementation of a Hospice Transition Protocol in an Emergency Department to Facilitate End-of-Life Care

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Objectives: The ED serves as a frequent interface for patients approaching end-of-life (EoL), with up to 75% of patients experiencing an emergency department (ED) visit in the last 6 months of life. Hospice care in the last 6 months is associated with improved patient experience, care satisfaction, and pain control. Earlier hospice enrollment also improves resource utilization by reducing hospital length of stay and readmissions. During the COVID-19 pandemic, our ED experienced an increased number of EoL patients receiving care in hallway beds while awaiting hospital admission or transfer to hospice care. Lack of patient privacy and limited prior training on caring for EoL patients contributed to the moral distress experienced by nurses, physicians, patients and families. To address this, we implemented and evaluated a hospice ED observation pathway (HEDOP) for EoL patients transitioning to comfort-focused care in the ED setting.

Design/Methods: A HEDOP was developed to guide treatment for EoL patients transitioning to comfort-focused care during the ED course. The pathway identified the appropriate patient population with inclusion/exclusion criteria (Table 1). A 'comfort measures' order set provided quick access to medication orders for common EoL symptoms such as dyspnea and pain, spiritual care and social work consultation. The ED observation unit is staffed by ED registered nurses and Advanced Practice Providers, with emergency physician support. To provide EoL education, we offered didactic lectures, bedside teaching from a palliative medicine fellow, and the opportunity to shadow providers at a local hospice facility.

Results/Findings: Over a 1-year period (January 2021-22), 38 patients were cared for using the HEDOP. Mean age was 77 years (range 43-102 years). Mean ED length of stay (including observation status) was 20 hours (range 3-49 hours). Patient disposition from the HEDOP was as follows: 29% home with hospice, 47% inpatient hospice facility, and 21% died during the observation stay. In addition to clinical EoL care and symptom management, 47% of patients received spiritual care and 97% had a social worker involved in their care.

Conclusion: To our knowledge, this is the first use of an ED observation protocol for hospice initiation in the US. Implementation of a HEDOP offered patients and families earlier access to hospice care from the ED. Providers reported being better equipped to provide care and tailored support for EoL patients. All but one patient avoided hospital admission; the majority were discharged to home or inpatient hospice. A HEDOP provides opportunity to help patients access hospice care from the ED, facilitates disposition from the ED to home or inpatient hospice, and receive quality EoL care while in the ED. Future studies should assess patient and family satisfaction with care received under an ED HEDOP.

Table1: HEDOP Inclusion and Exclusion Criteria

Inclusion	Exclusion
Life limiting illness and goals of care consistent with comfort measures only/hospice care	Complex symptom management requiring 1:1 nursing care
Plan to transition home with hospice	Inconsistent or unclear goals of care
Plan to transfer to inpatient hospice	Patient does not have medical capacity or a surrogate decision maker
If plan is to stay in ED observation unit for EoL, prognosis is hours to days	Prognosis longer than days and an unclear disposition plan

No, authors do not have interests to disclose

12 Early Mortality Risk Assessment Modeling by Random Forest Analysis of Patients Presenting to a Tertiary Medical Center Emergency Department

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Study Objectives: Identifying patients at higher risk for in-hospital mortality can inform shared decision making and Goals of Care (GOC) discussions. Traditionally, logistic regression (LR) has been used to develop mortality risk models, such as the sequential organ failure assessment (SOFA) and acute physiology and chronic health evaluation (APACHE) scores. The development of machine learning (ML) methods of analysis can yield higher area under receiver operating cure when compared to LR models and has been shown to generate predictive results much earlier in hospitalization than feasible previously. Unfortunately, some current risk assessment scores require lab values which are not frequently collected in the emergency department (ED), use truncated data sets for feasibility, or require serial comparisons which are not available within the first several hours of evaluation. The widespread use of electronic health record (EHR) systems allows for integrated multivariate ML models which can provide earlier predictions of mortality while decisions are still being made during a patient's initial care. The goal of this study is to develop an all-cause mortality prediction model, derived from commonly collected ED data, which can assess mortality risk early during an ED encounter.

Methods: Data was obtained for all patients age 18 and older admitted to Wake Forest Baptist Medical Center, now Atrium Health Wake Forest Baptist, from April 1, 2016 through March 31, 2020. A total of 77,119 patients met inclusion criteria, of these 52.8% were male and 47.2% were female. Initial vital signs including heart rate, respiratory rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, pulse oximetry, weight, and body mass index were electronically retrieved for all patients as well as all components of a comprehensive metabolic panel, and a complete blood count not including cell differentials. Random forest (RF) analysis, cross validation, and area under the curve analysis was applied to a training sample of 70% of the data set and with the remaining 30% being used as a test data set. Missing predictor data were imputed using RF imputation. Missing indicator variables were included in data models, as the presence of missing data can independently correlate with mortality. The Rapid Emergency Medicine Score (REMS) was used as a comparator for performance analysis since it contains similar variables and does not include values derived from blood gas analysis, as utilized by SOFA and APACHE.

Results: A full RF model of 68 variables, using 34 measured variables and 34 missing indicator variables yielded an AUC of 0.892 (0.876, 0.908) and a reduced model of 18 variables, using 12 measured variables and 6 missing indicator variables, yielded an AUC of 0.857 (0.838, 0.876) Table 1. Both the full and reduced RF models outperformed REMS in this dataset which yielded an AUC of 0.500 (0.457, 0.543).

Conclusions: Our RF model utilizing commonly used vital sign and laboratory data obtained on initial ED assessment is predictive of in-hospital mortality and was superior to REMS for this data set. Notably REMS was validated specifically in patients admitted to intensive care units which may partially account for the difference in performance between data models.

Table 1. Performance of Full Variable and Reduced Variable Random Forest Mortality Models

Model	RF Full Model (95% CI)	RF Reduced Model (95% CI)
AUC	0.892 (0.876,0.908)	0.857 (0.838, 0.876)
Sensitivity	0.823 (0.788,0.855)	0.833 (0.798,0.863)
Specificity	0.805 (0.800,0.810)	0.791 (0.785,0.796)
NPV	0.995 (0.994,0.996)	0.995 (0.994,0.996)
PPV	0.090 (0.082,0.099)	0.086 (0.078,0.094)

No, authors do not have interests to disclose

13 A Novel Approach to Dataset Labeling for Deep Learning Model Development

Duggan N, Jin M, Duran-Mendicuti M, Hallisey S, Selame L, Bernier D, Fischetti C, Samir A, Kapur T, Goldsmith A/Brigham and Women's Hospital, Boston, Massachusetts, US

Study Objectives: Machine learning models have substantial potential to augment medical imaging analysis and clinical decision-making. However, widespread development and adoption of these tools has been limited by the arduous task of generating expert-level annotated datasets for model training. Crowdsourced annotation, a new approach to dataset labeling, has the potential to address this unmet need. The aim of this work was to compare the accuracy of crowd-sourced and medical expert annotation on point-of-care ultrasound clips.

Methods: 2384 point-of-care lung ultrasound (LUS) clips from 203 patients were split evenly into training and test sets. Experts in LUS were defined as individuals with advanced training or registered diagnostic medical sonographer credentialing in emergency ultrasound. 200 LUS clips from each of the training and test sets were given to six experts for classification into one of three classes: a) No B-lines, b) 1 or more discrete B-lines, c) confluent B-lines). A reference standard was created from the expert labels using a majority rule with ties broken randomly. 103,528 crowdsourced opinions were collected for all LUS clips. 195 expert-labeled cases were used for training and performance measurement (ie, to identify the best crowd labelers) via several tasks launched over an 8-day period. Crowd performance was evaluated on 198 holdout expert-labeled test cases. All crowd and expert opinions were sourced using the DiagnosUs platform (iOS, Centaur Labs).

Results: Experts spent an average of 1.7 hours to submit their opinions for all 400 training and test LUS clips (min 0.9 hours, max 2.5 hours). The distribution of reference standard labels on the 195 training clips was 58% no b-lines, 29% discrete, and 13% confluent. The 198 test clips were 70% No B-lines, 18% discrete, and 12% confluent. The six experts' accuracies on the 198 test cases relative to the reference standard were 78.1%, 79.4%, 85.8%, 87.5%, 88.8%, and 91.1%. For the same cases, the crowd was 87.9% accurate relative to the reference standard. Test cases where the crowd was in at least 80% agreement showed 96% crowd accuracy relative to the reference standard. When the crowd opinion tended to be split, the experts tended to disagree (Pearson's r=0.70, p=5.1x10-59)). Similarly, when the crowd label was incorrect, this also tended to be in cases where the experts had conflicting opinions (60% average expert agreement for test cases where the crowd label was wrong vs. 89% where the crowd label was correct, p=5.7x10-12, Mann-Whitney U test).

Conclusion: Crowd-sourced annotations on LUS clips demonstrated similar accuracy to expert- generated annotations. Further, test cases with high degree of crowd agreement demonstrated excellent agreement between crowd- and expert-generated classification. This work has the potential to streamline data labeling for machine learning model development without compromising training dataset accuracy. Future studies assessing the performance of models generated from non-traditional model training platforms such as data labeled with crowdsourcing are needed.

No, authors do not have interests to disclose

14 The Impact of a Mixed Fast-Track and Mid-Acuity Track Area With a Vertical Component on Emergency Department Throughput

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Study Objectives: Fluctuations in staffing and patient volumes have stressed emergency department (ED) resources resulting in increased length of stay (LOS), increased door to doctor times for higher acuity patients, and increased left without being seen (LWBS) rates. Also, with the growing emergence of community urgent care centers, the need to staff a dedicated fast-track area in the ED has decreased. This study aimed to assess the impact of implementing a novel combined mid acuity track/fast track area with a vertical component that did not require additional department resources has on ED operations.

Study Design: This was a retrospective before-after study examining the effect of implementation of a mixed fast-track and mid-acuity track at a large suburban, academic emergency department in a level 1 trauma center with a patient volume of about 110,000 in 2021. This area did not utilize additional ED resources but reallocated two nurses from other areas of the ED and was designed to operate on weekdays. A third nurse was added at noon to act as a flow captain; they obtained triage labs ordered by the physician in triage, completed triage assessments, and assisted with determining utilization of rooms and hallway spots.

Following the initial triage process, patients with Emergency Severity Index (ESI) scores of 3 or 4 that were ambulatory or able to sit upright were selected for this area by a triage nurse or physician in triage. Patient selection was based upon high likelihood for discharge, not estimated resource utilization or LOS. Other patients with a higher probability for admission or those that could not remain vertical were seen elsewhere in the ED. The dedicated area had ten curtained rooms and four hallway spots in chairs. Some patients designated for this area remained in the waiting room awaiting results.

Once placed in the area, patients were then evaluated by a senior resident or physician assistant to examine the patient and discuss results, treatment plans, and disposition. All patients were seen by an attending physician before discharge. The total LOS of discharged ESI 3 patients, door to provider time of ESI 2 patients, and LWBS to the main ED was measured in the 4-month periods before and after the intervention in 2022.

Results: A total of 37,420 patients were seen in the four months prior to the implementation of the new mixed acuity tract and 35,591 were seen in the four months post implementation. The average LOS for discharged ESI 3 patients decreased from 352 to 301 minutes, a 14.5% decrease. The door to provider times for ESI 2 patients decreased from 89 to 54 minutes following implementation, a 39.3% decrease. The LWBS rate significantly decreased from an average of 6.2% to 2.3% ($p<0.01$).

Conclusion: Implementation of a mixed fast-track and mid-acuity track with a vertical component was associated with decreased LOS for ESI 3 patients, decreased door to provider times for ESI 2 patients in the main ED, and decreased LWBS rates. Overall patient throughput and ability to care for the higher acuity patients improved. This new process did not require utilization of additional resources or increased staffing, making it a feasible intervention to improve ED throughput and operations in settings where resources may be limited.

No, authors do not have interests to disclose

15 Facilitating Emergency Department Research on Older Adults Through Creation of a Research Data Warehouse

Weaver E, Zebrowski A, Malsch A, Simpson M, Israni J, Fuller T, Hendrick J, Brady E, Rouzbehani R, Hwang U/West Health Institute, San Diego, California, US

Study Objectives: Multi-site research is needed to strengthen the evidence-base about emergency department care for older adults at geriatric emergency departments (GEDs), which provide a unique set of clinical and non-clinical services to older adults. The complexities, data use restrictions, and time-intensive requirements of sharing patient-level data across sites have limited multi-site research on GEDs to date. The GED Research Data Warehouse (RDW) was created to facilitate cross-site analysis of longitudinal, patient-centered emergency department (ED) data. This presentation will describe the purpose of the RDW, its' creation, and characteristics and KPIs from the first four health systems to join the RDW and will suggest both planned and potential use cases of the GED RDW for future research.

Methods: The GED RDW was created using a secure, cloud-based, multi-site research infrastructure. It contains ED encounter data for adults aged 65 and older to support the evaluation of interventions aiming to improve care for this population. Data quality checks were performed on the data submitted to the RDW and descriptive statistics from four health systems were generated using Structured Query Language.

Results: Four initial health systems with 20 unique sites have provided ED data from almost 1 million encounters between the years 2016-2020 (n=937,396). Participating sites come from the Midwest (n=15), Northeast (n=4) and Western (n=1) regions and are primarily located in small and large metropolitan areas. Fifteen percent of sites (3/20) are level one trauma centers with the majority accredited as Level 3 GEDs (15/20). All participating sites use Epic electronic health medical record software. Aggregate KPIs from these sites show an ED to hospital admission rate of 38.4%, 30-day ED revisit rate of 20.8% and an average length of ED stay of 4 hours 46 minutes.

Conclusions: Creation of the GED RDW has shown that aggregating data into a data warehouse for multi-site research is feasible. Descriptive statistics from an initial four health systems provide a snapshot of the geographic spread and variation in participating EDs. This information can serve as a guide for researchers seeking to use the GED RDW data for analysis, specifically researchers seeking a tailored GED dataset with a sample and data elements that are not available through other sources. Persisting through the logistical and security hurdles can result in research opportunities that inform provision of patient care for older adult patients.

No, authors do not have interests to disclose

16 The Impact of an Emergency Department Alternatives to Opiates (ALTO) Program on Opiate Administration

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Study Objectives: The primary aim was to measure the impact of an Alternatives to Opiates (ALTO) program on decreasing opioid administration in the emergency department (ED).

Methods: We launched an ALTO program in November 2019 across 9 EDs within an integrated health system that together sees approximately 450,000 patient encounters annually. A multi-disciplinary group inclusive of ED providers, pharmacists, and nursing developed the ALTO program using existing best practices and publications. The program included a "Quicklist": an organized section of non-opiate pain medications for indicated conditions, readily accessible within the electronic medical record (EMR). Prior to implementation, we provided education to clinicians and nursing and continued re-education in 4-month intervals after program implementation. For this analysis, we included all patients if they were discharged from the ED. Our primary outcome consisted of opioid administration, measured in morphine milliequivalents (MME) per discharged patient encounter. We compared the average MME in the 3 years prior to vs. the 21-month period following program implementation (December 2019 – August 2021). We secondarily measured the change in administration of intravenous sub-dissociative ketamine, oral methocarbamol, and lidocaine patches during the same periods, adjusted for ED volume.

Results: Opiate administration decreased across the entire Henry Ford Health System (HFHS) from 1.46 $\pm$0.58 MME per patient encounter to 1.31 $\pm$0.53 MME per patient encounter, an 11.7% (95% CI 2.7 - 18.8%, $p=0.015$) decrease. Across the 9 HFHS EDs the percentage change was variable ranging from a 1% increase in one particular ED to a 29.0% decrease in another ED. Sub-analysis showed opiate administration at the largest ED decreased from 2.59 MME per patient encounter to 2.17 MME per patient encounter, a 16.1% (95% CI 6.1 - 26.1 %, $p<0.001$) decrease. Across all EDs, intravenous sub-dissociative ketamine administrations increased 186.2% ($p<0.001$), oral methocarbamol administrations increased 28.6% ($p<0.001$), and lidocaine patch administrations increased 132.6% ($p<0.001$) in the 21.5-month period after ALTO implementation as compared to the 21.5-month period before ALTO implementation after adjustment for ED volume.

Conclusions: The HFHS ALTO program significantly decreased opiate administration across the system. The increase in the use of ALTO medications suggests adoption of the ALTO program amongst providers. Continued ALTO program education is needed as is further study with more nuanced data analysis accounting for ED length of stay and provider level data.

No, authors do not have interests to disclose

17 Saline Versus Plasma Solution-A in Initial Resuscitation of Patients With Out-of-Hospital Cardiac Arrest: A Randomized Clinical Trial

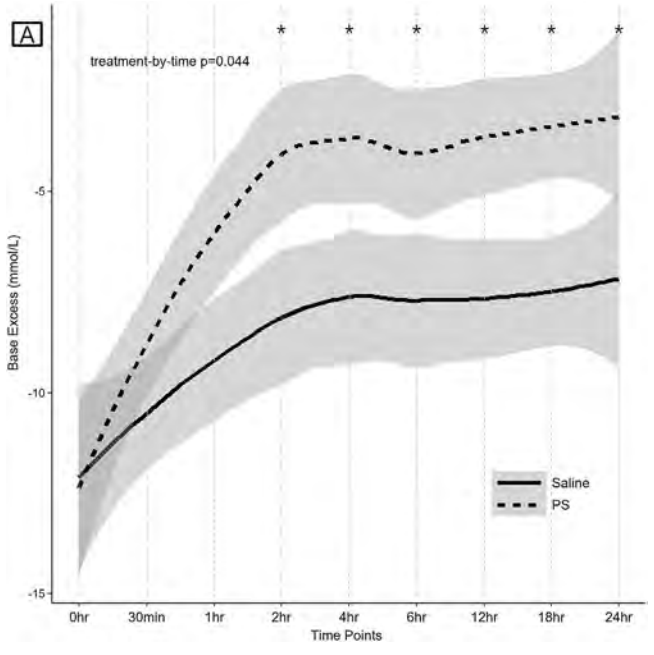
Woo J-H, Lim YS, Cho JS, Yang HJ, Jang JH, Choi JY, Choi WS/Gachon University Gil Medical Center, Gachon University College of Medicine, Incheon, Incheon, KR

Objectives: Although most commonly used during cardiopulmonary resuscitation (CPR) or post-cardiac arrest care, saline causes hyperchloremic metabolic acidosis, which has detrimental clinical effects. Furthermore, the optimal fluid for use in these circumstances remains undetermined. We hypothesized that compared with the use of saline, the use of a balanced crystalloid (Plasma Solution-A [PS]) in out-of-hospital cardiac arrest (OHCA) patients would result in a faster improvement of acid-base and electrolyte balance, and better clinical outcomes.

Methods: We conducted a randomized, unblinded clinical trial in which the use of PS was compared with the use of saline for intravenous fluid administration during CPR and post-cardiac arrest care of non- traumatic OHCA patients admitted to a tertiary university hospital emergency department. Based on a randomization scheme, patients received either saline (saline group) or PS (PS group) within the first 24 hours after hospital arrival. The primary outcomes were changes in the arterial pH, bicarbonate, base excess (BE), and chloride levels within 24 hours. The secondary outcomes included acute kidney injury development, hemodynamic status, neurological outcomes, and mortality.

Results: Of 364 randomly assigned patients (183 in the saline group and 181 in the PS group), 27 in the saline group and 26 in the PS group were finally analyzed after excluding patients who could not follow the trial protocol. The change in BE was significantly different between the two groups over time in a linear mixed model analysis (treatment-by-time p=0.044), and the increase in BE in the early phase was significantly greater in the PS group (p=0.044). The development of hyperchloremia was more frequent in the saline group (13 (48.1%) vs. 0 (0.0%), p<0.001). In multivariate logistic analysis, the lowest systolic blood pressure within 24 hours and survival at 6 months were not associated with the type of allocated crystalloids (p=0.362 and p=0.211, respectively).

Conclusions: Compared with resuscitation with saline, resuscitation with PS in OHCA patients resulted in a faster improvement in acid-base balance and a lower incidence of hyperchloremia without differences in hemodynamic status and clinical outcomes. PS may provide opportunities for more stable post-cardiac arrest care.



No, authors do not have interests to disclose

18 Atomized Intranasal Ketorolac Versus Intravenous Ketorolac for Treatment of Severe Renal Colic in the Emergency Department: A Double-blind, Non-inferiority, Randomized Controlled Trial

Al-Khalasi U, Al-Alalawi A, Al-Jufaili M, Al Reesi A, AL-Zakwani I/Oman Medical Specialty Board, Muscat, Muscat, OM

Study Objectives: Timely analgesia administration is crucial in treating patients with severe renal colic. Atomized Intranasal administration offers rapid painless analgesia compared to the intravenous route. This study aims to evaluate the efficacy of intranasal (IN) ketorolac vs intravenous (IN) ketorolac in relieving acute renal colic among emergency department patients.

Methods: In this non-inferiority, randomized controlled trial, patients with a clinical diagnosis of severe renal colic as assessed Visual Analogue Scale (VAS) were enrolled at an academic university hospital. Adult patients (aged 18–64 years) with severe pain (VAS≥7.0) were included. They were excluded if had a contraindication to nonsteroidal anti-inflammatory drugs (NSAIDs) or had recent NSAIDs use (within 8 hours of presentation). A computer-generated randomization sequence was used to allocate patients randomly in a 1:1 ratio to receive a single dose of either IN Ketorolac 30 mg + IV normal saline or IV Ketorolac 30 mg + intranasal normal saline. The primary endpoint was a reduction in pain score at 60 minutes. Pain scores were recorded at baseline (VAS 0), 30 (VAS 30), and 60 (VAS 30) minutes. Possible treatment side effects were also recorded. Non-inferiority was shown if the upper limit of the two-sided 95% CI for the difference in VAS was lower than 2 points. Results were analyzed using intention-to-treat analyses done.

Results: Of 171 subjects randomized, 86 were allocated to receive IV ketorolac, and 85 to receive IN ketorolac. Patients in the two groups were similar in their baseline characteristics, stone sizes and locations, the presence of obstructive stones, and the initial pain scores. The mean difference between VAS 0 and VAS 60 was 5.71±2.99 for IV ketorolac and 5.61±3.274 in the IN-ketorolac group respectively (P = .839). The difference in mean pain reduction at 60 min between groups was 0.22 (95% CI −0.75, 1.20) and the upper limit of the 95% CI was less than the non-inferiority margin. Response to treatment -defined as VAS of 3 or less at 60 minutes- was achieved in 60 (69.8%) patients receiving IV ketorolac compared to 57 (67.1%) patients receiving IN ketorolac (P =.414). Rescue analgesia were required in 10 patients (11.6%) in the IV group and 9 patients (10.6%) in the IN group (P = .511). No major side effects were observed in this study.

Conclusions: Ketorolac is effective acute pain management for patients with severe renal colic. Atomized Intranasal administration of ketorolac is non-inferior to the intravenous route providing an effective, fast, and non-invasive option and can be an effective alternative analgesia.

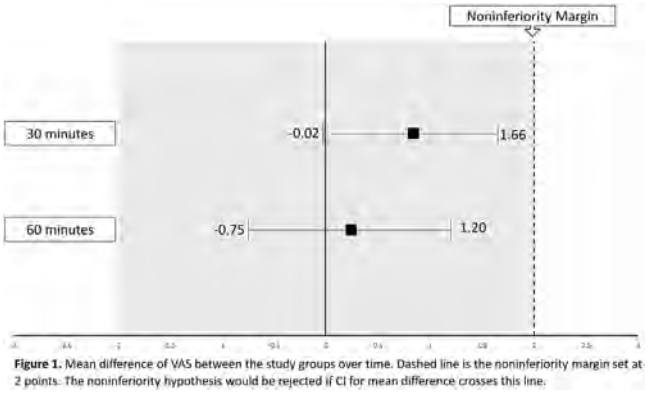


Figure 1. Mean difference of VAS between the study groups over time. Dashed line is the noninferiority margin set at 2 points. The noninferiority hypothesis would be rejected if CI for mean difference crosses this line.

No, authors do not have interests to disclose

18b Comparative Safety and Efficacy of a Hybrid Intravenous and Oral Diltiazem Protocol for Acute Rate Control in the Emergency Department

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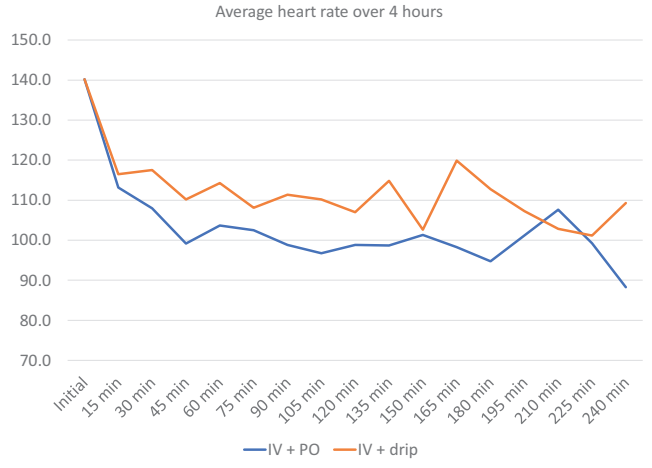
Study Objectives: Intravenous diltiazem has experienced numerous supply shortages over the past few years. Additionally, the administration of continuous IV diltiazem infusions must be monitored on specialized hospital units at the study institution. These units may have limited bed space during periods of high census. Due to these factors, a hybrid combined intravenous (IV) bolus and oral maintenance protocol was developed. The purpose of this study was to compare the safety and efficacy of a traditional diltiazem IV bolus and continuous infusion protocol to a diltiazem IV bolus and oral maintenance protocol for acute rate control in the emergency department (ED).

Study Design/Methods: This was a single-center, IRB-approved, retrospective, matched cohort evaluation conducted at an 864-bed community tertiary referral center hospital with over 200,000 average annual ED visits during the study period. Patients who received intravenous diltiazem in the emergency department between January 1, 2015 and May 30, 2019 were screened. Patients were included and grouped accordingly if they received the traditional diltiazem IV bolus and continuous infusion protocol (IV + drip group) or the hybrid diltiazem IV bolus and oral maintenance protocol (IV + PO group). Patients were excluded if there was incomplete data available in the electronic medical record, received other rate control medications prior to diltiazem, a pre- diltiazem initial heart rate less than 100 bpm, or were diagnosed with an aortic dissection. Patients were generated a propensity score based on age, sex, weight, initial rhythm, and initial heart rate. Patients in each group were then matched 1:1 using nearest-neighbor matching. The primary outcome was the proportion of patients with rate control, defined as mean heart rate less than 110 bpm during the fourth hour from initiation of treatment, without need for additional rate control agents or additional IV diltiazem boluses during diltiazem maintenance phase. Continuous variables were analyzed using an unpaired, two-tailed student's t- test. Categorical variables were analyzed using the Pearson chi-square test. A two-tailed p-value of <0.05 was considered significant for all analyses.

Results/Findings: A total of 106 patients were matched with 53 patients in each group. Baseline characteristics were similar with a mean age of 74 years and a mean initial heart rate of 140 bpm. For the primary outcome of rate control at four hours, 62.3% of patients in the IV + drip group versus 75.5% of patients in the IV + PO group ($p = 0.142$) achieved rate control. Mean heart rate in both groups measured at 15 minute intervals over 4 hours is represented graphically in Figure 1. In regards to safety, 11.3 % of patients in the IV + drip group experienced hypotension, compared to 1.9% IV + PO in the group ($p = 0.051$). The incidence of bradycardia was 3.8% in the IV + drip group, compared to 0% of patients in the IV + PO group ($p = 0.153$).

Conclusion: Results of this study demonstrated no difference in acute rate control when using a hybrid IV and oral diltiazem protocol, compared to a traditional IV bolus and drip strategy. This information supports the further use of a hybrid diltiazem IV and oral protocol, which provides increased flexibility during shortages of either medication or bed spaces on specialized hospital units.



No, authors do not have interests to disclose

19 Utilization of Advanced Providers in the Field for Medical Custody Clearance

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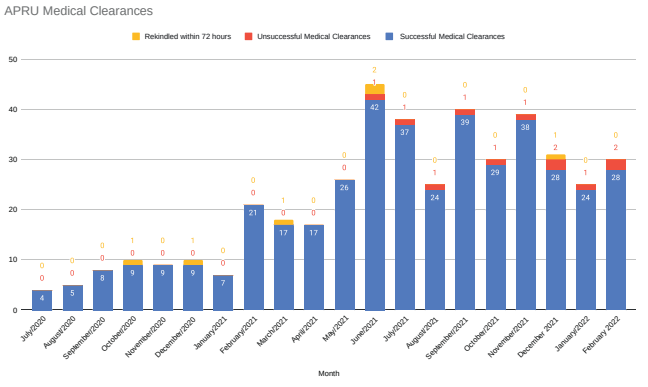
Objectives: From July 2020 to February 2022, the Los Angeles County Sheriff's Department (LASD) made 6,630 arrests in the city of Lancaster. Each patient in custody is medically screened before booking, and those with medical complaints or significant medical history require medical clearance. The LASD has a policy that medical clearance is to be performed at a health care facility; thus, the only emergency department (ED) in the city, Antelope Valley Hospital, has been providing medical clearance. The Los Angeles County Fire Department (LACoFD) utilizes an Advanced Provider Response Unit (APRU) in the field with the primary mission of treating and releasing low-acuity patients on scene who often are frequent users of the 9-1-1 system. LASD custody clearances represented a very low-acuity patient population which overlapped with the mission of the APRU and was integrated into the daily operation of the pilot program. This study is a proof of concept for the APRU program and aims to evaluate the utility of providing patients with medical custody clearance by the APRU.

Methods: This is a retrospective review of all medical custody clearance requests from the LASD Lancaster station to the LACoFD's APRU from July 2020 to February 2022. The APRU is a rapid response vehicle staffed by an advanced provider (AP) and a Captain firefighter/paramedic, equipped with basic point-of-care testing capabilities, and linked to incidents by request of on-scene first responders or self- assigned by monitoring EMS radio traffic between the hours of 8 am - 6 pm, seven days a week. Summary descriptive statistics were collected regarding the volume of patients receiving medical custody clearance for incarceration from the LASD Lancaster Station, alternate patient dispositions, the volume of ED visits avoided, and EMS transportation costs saved.

Results: From July 2020 to February 2022, the Lancaster APRU completed 421 (mean 21.1 clearances per month, median 22.5, Range 4 - 42) pre-incarceration medical clearances consisting of 6% of the LASD's Lancaster station arrests during the period. Of 421 clearances, 404 (95.9%) were cleared on scene; 11 (2.6%) were unable to be cleared on scene and needed further assessment in an ED due to advanced cardiac (3), neurological (2), orthopedic (2), traumatic (1), patient non-compliance (1), or police deferred transport (1) reasons; and 6 (1.4%) were initially cleared on scene, but were called back within 72 hours due to new patient symptomatology (4) or new patient injury (2) and all were subsequently medically cleared again. In total, 410 9-1-1 emergency ambulance transfers and ED visits were avoided.

The cost of a basic life support (BLS) ambulance 9-1-1 response in Los Angeles County is $1,702.00 resulting in a savings of $697,820.00. The average cost of an ED visit in Los Angeles County is $1,426.00 resulting in a savings of $584,660.00. All ED visits for custody clearances require two LASD deputy chaperones. An average LASD deputy costs $43.75 per hour, and the average ED wait time in Lancaster is four hours; this represents a savings of $143,500.00. Altogether, the APRU saved $1,425,980.00 in local EMS system costs over 19 months.

Conclusions: The LACoFD has established a proof-of-concept with its APRU to lessen the burden of low-acuity ambulance transports and ED visits. The APRU's utilization in medical custody clearances is an efficacious alternative to costly law enforcement chaperoning, EMS transport, and ED care.



No, authors do not have interests to disclose

20 Outcome Study of Mild Traumatic Brain Injury Patients Integrating a Brain Electrical Activity-Based Decision Rule

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Background / Study Objectives: Clinical decision rules such as the Canadian Head CT rule have high sensitivity but lack specificity for identifying significant intracranial findings when evaluating patients with mild traumatic brain injury (mTBI). Advances in brain electrical activity (EEG) signal processing, real-time analyses, and use of an AI/machine learning for the derivation of brain activity-based biomarkers have greatly enhanced the pragmatism of EEG clinically. High accuracy and negative predictive value have been demonstrated (n-720) using an FDA cleared brain activity-based multivariate algorithm for predicting the likelihood of intracranial injuries with $\geq$ 1mL blood visible on a CT scan. The SIC algorithm was derived using machine learning to identify distinctive waveform patterns in these mTBI patients. The purpose of this study was to evaluate the utility of an EEG-based structural injury classification (SIC) when added to the clinical evaluation of mTBI patients.

Study Design / Methods: A multi-center, prospective observational cohort study. Patients were eligible that were 18-85 years, sought ED care for traumatic closed head injury within 72 hours, and had a GCS 14-15. We excluded patients with conditions that prevented application of electrodes on the forehead, known neurological disease such as dementia or stroke, use of anticoagulants, age <18 years, and those with acute psychosis. We collected 5-10 minutes of eyes-closed EEG from frontal and frontotemporal regions, using an FDA cleared EEG-based algorithm (SIC). Clinician evaluations and imaging were conducted as per standard care with the addition of acquiring and sharing the results of the SIC algorithm with the clinicians. Clinicians were educated on the results of previous clinical trials utilizing this algorithm prior to study start up. Follow-ups included a symptom inventory and information on the need for additional clinical care or neuroimaging evaluation and was conducted by phone 72-96 hours after the initial evaluation.

Results / Findings: We present the results of the 142 subjects enrolled with a negative SIC result (those identified as likely no structural injury visible on CT). Their average age was 31.2 (18.3-75.3 years) and 86 (58%) were female. The most common injury was motor vehicle accident (70%). Treating clinicians nevertheless performed head CT on 36 (25%) participants, all of which were CT negative. Treating clinicians discharged the remaining 106 (75%) SIC negative participants without neuroimaging. In follow-up, 2 of these 106 participants returned to the hospital and received CT scans, both of which were found to be negative.

Conclusion: Integration of a rapid EEG-based algorithm in the evaluation of mTBI has the potential to reduce the utilization of neuroimaging.

Yes, authors have interests to disclose

Research was funded by BrainScope (Bethesda, Maryland).

21 Emergency Department Observation of Children With Minor Blunt Head Trauma

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Objective: The Pediatric Emergency Care Applied Research Network (PECARN) traumatic brain injury (TBI) prediction rules suggest a period of observation prior to decision-making regarding computed tomography (CT) in children with minor blunt head trauma (BHT) who are not immediately identified as high- or very low-risk of clinically important TBI (ciTBI). We sought to evaluate the role of observation in the management of children with minor BHT.

Methods: We performed an a priori subanalysis of a prospective multicenter study of children with minor BHT (Glasgow Coma Scale Score $\geq$14). Physicians documented whether a child was observed before deciding on CT. We defined ciTBI as a TBI resulting in death, neurosurgical intervention, intubation > 24 hours, or admission for >2 nights due to the TBI in association with a positive CT. Guardians of patients discharged from the emergency department (ED) were contacted one week later to assess for ciTBI. To determine the association of observation on CT use, a multivariable logistic regression model controlling for hospital clustering and patient characteristics was created for patients < 2 years and $\geq$ 2 years old.

Results: 20,316 children (mean age $\pm$ standard deviation: 6.5 $\pm$ 5.3 years) were enrolled. Clinicians noted if the patient was observed before CT decision-making in 20,037 (99%) patients, and 4,564 (23%) patients were observed. The CT rate was 619/4,564 (13.6%) in those observed versus 5,779/15,473 (37.3%) in those not observed (difference: 23.8%; 95% confidence interval (CI): 22.5 to 25.0%). The rate of ciTBI was 14/4,564 (0.3%) in those observed versus 210/15,473 (1.4%) in those not observed (difference: 1.0%; 95% CI 0.8, 1.2%). The median age in those observed (4.0 years) was lower than those not observed (5.3 years, p<0.001). After adjustment for hospital and patient characteristics, observation was associated with decreased CT use in both patients < 2 years (odds ratio = 0.15 [95% CI 0.12, 0.19]) and $\geq$ patients 2 years (odds ratio = 0.15 [95% CI 0.12, 0.17]). The median length of stay (LOS) for patients who had an immediate CT decision (2.6 hours) was shorter than that for observed patients (2.97 hours, p<0.001). In the 619 patients who underwent CT after observation, the median time from ED arrival to CT was 1.75 hours. 90/619 (15%, 95% CI 12, 18%) had TBI on CT and 14/619 (2.3%, 95% CI 1.2, 3.8%) had ciTBI. 4,182 patients were discharged home after observation without CT and none (0%, 95% CI 0.000, 001%) were subsequently identified with ciTBI.

Conclusions: Observation was associated with a safe decrease in CT use among children with minor BHT with a slight increase in ED LOS. For children who are not immediately identified as having high- or very low-risk of ciTBI, a period of observation is recommended.

No, authors do not have interests to disclose

22 Efficacy of Emergency Department-Initiated 14-Day Ambulatory ECG Patch Monitors in Patients With Unexplained Syncope

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Study Objectives: Syncope is a common and costly emergency department (ED) chief complaint. Unfortunately, more than 50% of high-risk syncope patients do not follow up for further outpatient cardiac monitoring following ED or hospital discharge. Leadless and wireless ECG patch monitors are now widely available for ambulatory cardiac monitoring. We initiated a protocol in which ED physicians were given the option of discharging patients with a diagnosis of syncope with a 14-day ambulatory ECG monitor (AEM) placed by ED staff. The objective of this study is to evaluate the efficacy of our ED AEM protocol as defined by a change in medical management.

Study Design: This is a retrospective chart review of all ED patients, including both the ED and ED observation unit (with less than a 48-hour stay), with unexplained syncope who were discharged wearing an AEM between February 2019 and May 2021. Medical management was *a priori* defined as the initiation of new cardiovascular medications, further diagnostic testing, or cardiac-related procedures. We provide descriptive statistics and use chi-square for comparison of groups.

Results: 126 patients with unexplained syncope and AEM placement at the time of discharge were identified during the study period. 115 patients (53% female, age 58.5 $\pm$ 17.4 years) complied with wearing and returning the AEM and were included in the final analysis. 51 patients (44.0%) were directly discharged from the ED and 65 patients (56%) were discharged from the ED observation unit. 11 patients (9.6%) required ED provider calls to discuss AEM findings, 4 (3.5%) of which required emergent call back to the ED based on diagnoses of sustained ventricular tachycardia, sinus pause >6 seconds, or complete heart block. Ultimately, 12 patients (10.3%) had AEM findings that resulted in a change in medical management of: initiation of medications (58%), pacemaker implantation (25%), implantable or other loop recorder monitoring (25%), diagnostic cardiac catheterization (16.7%), and arrhythmia catheter ablation (8.3%). Change in medical management was not statistically significant when comparing patients with ED discharge to ED observation discharge (6.3% vs. 14.1%, p=0.15). No patients experienced sudden death or injury due to arrhythmia after ED discharge with AEM.

Conclusion: ED-placed AEMs for patients with unexplained syncope show high compliance rates and led to clinically important changes in medical management. Future prospective trials should assess time to change in medical management and time to arrhythmia diagnosis and incorporate a control group.

No, authors do not have interests to disclose

23 "Tele-observation": Evaluation of a Virtual Provider Program in an Emergency Department Observation Unit

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Objectives: The critical shortage of health care providers has been accelerated by the COVID-19 pandemic into a staffing crisis. In this setting, it became infeasible for

our large tertiary academic hospital to consistently staff our emergency department observation unit with on-site providers. Telemedicine has been utilized and studied as a solution to this shortage in part because it enhances access to a larger staffing pool and allows for increased flexibility without geographic constraints. While telemedicine is well vetted across the continuum of health care, there is a paucity of data regarding the use of telemedicine in the observation medicine setting. This study aimed to primarily evaluate the safety and quality of care and secondarily the satisfaction of staff and patients when using a virtual provider in an emergency department observation unit.

Design/Methods: This prospective observational quality improvement study occurred over a three month period where a virtual provider was piloted in an emergency department observation unit on dedicated night shifts at a tertiary care, academic hospital. Utilizing structured survey instruments and post shift interviews, nursing and provider perceptions of care were assessed across multiple domains of both health care quality, safety, and workflow efficiency. Secondary objectives evaluated include: patient and staff satisfaction, overall observation unit census and number of patients upgraded to a higher level of care. Patient satisfaction was assessed through surveys with questions based on Emergency Department Consumer Assessment of Healthcare Providers and Systems (ED-CAHPS) questionnaires. These were compared to the unit's ED- CAHPS results in the three month time frame prior to the pilot.

Results/Findings: 89% of nurses rated the virtual provider as equal, or better than an in-person provider when addressing clinical concerns. 96% of nurses similarly reported that the virtual provider was more or equally accessible. Moreover, 89% highlighted that the telemedicine workflow resulted in minimal or no increase to their work burden. Of the 16 virtual providers, 14 reported that they were *"extremely"* or *"very"* able to deliver appropriate care and engage with patients; the other 2 providers reported they were "*somewhat able*." 97% of patients reported satisfaction regarding their telemedicine experience. 3% of patients reported a neutral experience and none endorsed being dissatisfied. For ED-CAHP scores in the following categories: "*treated with courtesy and respect,*" "*listened carefully,*" "*explained in a way you understand,*" virtual providers scored "always," the highest mark possible, greater than 93% of the time. Comparatively, in-person providers scored, "*always*", 63-73% of the time in the above categories during the three month period prior to this pilot. There was only one patient upgraded to a higher level of care, which compared favorably to baseline.

Conclusions: After implementation of a virtual provider in an emergency department observation unit, clinical staff and patients perceived virtual care to be either similar or improved as compared to an in-person provider. A virtual provider may be an efficient and safe staffing solution in an emergency department observation unit. This may be particularly relevant in the context of an ongoing nationwide staffing crisis.

No, authors do not have interests to disclose

24 Emergency Department Virtual Telehealth Rounding – A Strategy for a Pandemic and Beyond

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Objective: Telehealth in the ED seems counterintuitive. However, COVID-19 surges have led to crowding and increases in patients leaving without being seen (LWBS). This study evaluated the impact of a novel virtual telehealth initiative (virtual telehealth rounding or VTR) in the ED on the prevalence of LWBS dispositions during the pandemic and its effect on mortality and patient safety.

Methods: We conducted a cross sectional study on adult patients presenting to a level 1 trauma and tertiary referral center who were triaged to the waiting room. The trial of VTR took place for 107 days in December 2021-April 2022 and was operational for 65 days (8-hours a day). The remaining 42 days without VTR served as a comparison group. During VTR patients were triaged per usual care on arrival to the ED. Those patients with triage acuity categories II to V who were triaged to the waiting room were then evaluated virtually by a remote clinician (advanced practice providers such as physician assistants, advanced nurse practitioners, and third year emergency medicine residents) after their initial screening examination using a secure virtual health platform in a private cubicle in the ED waiting room. Patients were then reevaluated at 1-2 hour intervals if necessary. ED paramedics were available onsite to take vital signs, transport patients, and communicate directly with the onsite nurses and ED physicians. Patients were evaluated virtually via an iPad by the virtual clinician and provided an initial assessment. They expedited care by ordering labs, radiography, changing the patient's triage category and determining early disposition according to usual clinical practice. Patients were then either left to wait in the waiting room, taken for radiography and/or blood work, or taken back to a room in the ED where they were seen by an onsite ED physician. The main outcome was the LWBS rate, including LWBS before and after triage, patients leaving against medical advice and elopements. Secondary patient outcomes included in-hospital mortality and improved patient safety via "great saves" defined as care that was urgently/emergently escalated by the virtual rounding provider.

Results: There were 19,958 patients in the analysis, 6,953 (35%) were evaluated via VTR and 13,006 (65%) received standard of care. Mean patient age was 50 years (SD20), 48 (95% CI 48-49) in the VTR group and 50 (95% CI 50-51) in the standard group. Females were 49%, with 3,489 (50%) females in the VTR group and 6,204 (48%) in the standard care group. Overall acuity levels at triage were II 24%, III 54%, IV 22%, and V 1%. Mean triage levels were 2.95 (95% CI 2.94-2.97) in the VTR group and 3.07 (95% CI 3.06 – 3.09) in the standard group. The proportion of LWBS was 565 (8%) in the VTR group and 3,246 (25%) in the standard care group ($p<0.001$). Overall, 27 (0.1%) of patients did not survive to hospital discharge, 7 (0.1%) in the VTR group and 20 (0.2%) in the standard care group ($p=0.421$). VTR clinician documented "great saves" in 5% of their patient encounters.

Conclusion: This novel approach to triage in the ED significantly reduced the proportion of patients with LWBS dispositions by 17%. Although in-hospital mortality was lower in the VTR group it was not statistically significant. Furthermore, VTR clinicians documented rapid escalations in care that may have otherwise been delayed or missed. This approach has the potential to improve patient care and provide relief from crowding.

No, authors do not have interests to disclose

25 Derivation and Validation of a Clinical Decision Rule to Risk Stratify Emergency Department Patients Diagnosed With Seasonal Influenza

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Study Objectives: Seasonal influenza is diagnosed in over 1 million United States emergency department (ED) visits yearly and leads to over 12,000 annual US deaths. Evidence to aid emergency medicine providers in risk-stratifying patients diagnosed with influenza in the ED is limited.

Methods: We completed a single-center retrospective cohort study evaluating all patients with a positive influenza test collected in the ED of a large tertiary care center that evaluates more than 88,000 patients annually. We analyzed clinical factors easily measured in the ED including demographics, vital signs, chest x-ray findings, and basic laboratory test results. We then developed a clinical decision rule to predict intubation or death in a derivation cohort comprised of patients diagnosed with influenza between 2007 and 2018 using those clinical factors with the most robust associations with the composite outcome of intubation or death. The rule was then validated in a second independently collected and analyzed retrospective cohort of influenza-positive patients evaluated in the same ED from 2018 to 2020.

Results: We analyzed patient-level data from 2,196 subjects in the derivation cohort and from 933 subjects in the validation cohort. Seventy (3.2%) and twenty-one (2.3%) patients were intubated or died in the derivation and validation cohorts, respectively. The combined cohorts were 56.7% female, 72.8% black, and 21.9% white. We found that a clinical decision rule assigning increasing risk to patients with 1) age $\geq$ 50, those with 2) two or more CDC-defined medical conditions associated with increased risk for influenza, those with 3) an SpO2 $<$ 96% on room air or requiring oxygen at triage, those with 4) a respiratory rate $\geq$ 22, those with 5) multifocal opacities or 6) a pleural effusion on chest x-ray, those with 7) a blood glucose concentration $\geq$ 130 mg/dL, those with 8) a blood urea nitrogen concentration $\geq$18 mg/dL, those with 9) a blood lactate concentration $\geq$ 1.7 mmol/L, and those with 10) a red cell distribution width $\geq$ 15% could successfully predict the need for intubation or death. This 10-component clinical decision rule exhibited an area under the curve (AUC) of 0.897 and 0.809 in the derivation and validation cohorts, respectively. The decision rule demonstrated high sensitivity for severe disease and substantially better performance than CURB-65 in the same cohorts. Removing the laboratory testing and chest x-ray components of the rule (factors 5-10) did not markedly affect performance, and the AUCs decreased to 0.841 and 0.795 in the derivation and validation cohorts.

Conclusions: This clinical decision rule shows promise in the risk stratification of patients diagnosed with seasonal influenza in the ED. It can assist emergency physicians in determining which patients with a positive influenza test during ED evaluation are at risk for progression to severe disease and therefore should be considered for inpatient admission. It performs better than existing clinical decision

rules and a refined version excluding laboratory testing and imaging also performs well. This novel tool, once appropriately validated, represents a potentially practice-changing adjunct to preventing unnecessary admissions during the seasonally overwhelming surge of influenza patients encountered in EDs around the world each year.

No, authors do not have interests to disclose

26 Emergent Large Vessel Occlusion Stroke Direct Triage Models: A Systematic Review and Meta-Analysis

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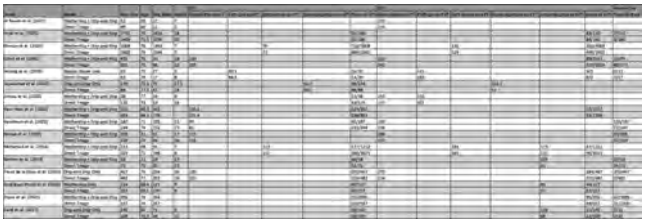
Study Objectives: Out-of-hospital systems of care for emergent large vessel occlusion (ELVO) stroke have evolved in recent years. There has been a shift from transporting all stroke patients to the closest stroke center for potential intravenous thrombolysis (IVT) to preferentially transporting patients with a suspected ELVO directly to thrombectomy capable stroke centers (TSCs), potentially bypassing closer primary stroke centers (PSCs). Numerous recent publications have compared transporting patients to PSCs for potential IVT followed by an interfacility transfer to a TSC (Drip-and-Ship) versus bypassing a PSC in favor of a TSC (Direct Triage). Previous systematic reviews comparing Drip-and-Ship versus patients triaged directly to a TSC without bypass of a PSC (Mothership) have been performed but there has yet to be a focus on Direct Triage. Our objective was to perform a systematic review to determine which models lead to improved time metrics and treatment rates.

Methods: We registered the systematic review on the international prospective register of systematic reviews (PROSPERO) and followed Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. We used the Nested Knowledge AutoLit living review platform to search PubMed for studies referencing stroke; EMS or out-of-hospital; Mothership, triage, bypass, or Drip-and-Ship; and endovascular thrombectomy (EVT) from 01/2015 to 05/2022. Our primary endpoints were onset/last known well (LKW)-to-IVT and LKW/onset-to-EVT. Secondary endpoints included other time metrics and rates of IVT, EVT, and interfacility transfers for potential EVT.

Results: Our search identified 390 studies and 16 were included (Table). Studies used different models as comparisons to Direct Triage, such as Mothership + Drip-and-Ship (n=11), Drip-and-Ship only (n=3), Mothership only (n=1), and Mobile Stroke Unit (MSU; n=1), as well as varied on whether the Mothership model was included within the Direct Triage model cohort (several only included patients with a known bypass of a PSC). Studies varied significantly in the outcomes reported, with time metrics including onset/LKW-, EMS call-, EMS arrival-, EMS departure-, and first hospital-to-IVT or EVT. Times to IVT were similar between Direct Triage and Drip-and-Ship +/- Mothership, but faster for the MSU patients. There were no appreciable trends in the rates of IVT between studies. Times to EVT in Direct Triage were faster than Drip-and-Ship +/- Mothership and similar to Mothership only and MSU. We performed a meta-analysis of 3 studies showing that Direct Triage was significantly faster than Mothership + Drip-and-Ship in the onset/LKW-to-EVT time interval (SMD, -1.07; 95% CI [-1.50, -0.63]). EVT rates were similar or higher in Direct Triage versus Drip-and-Ship +/- Mothership and a meta-analysis of 4 studies of the rate of EVT among all stroke patients revealed a significant increase in Direct Triage (OR, 1.61; 95% CI [1.01, 2.56]). Interfacility transfer rates significantly decreased in before/after studies following the implementation of Direct Triage.

Conclusions: Direct triage models have the potential to save significant time to EVT, without prolonging time to IVT, as compared to Drip-and-Ship +/- Mothership models in certain geographies. This may lead to higher rates of EVT for the population. There is, however, a substantial need for standardized reporting of time metrics and model comparisons in stroke systems of care.



No, authors do not have interests to disclose

27 Combining Machine Learning and Network Science to Cluster Emergency Department Chief Complaints and Diagnoses

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Study Objectives: Improvements to electronic health record (EHR) systems have enabled the adaptation of emergency care practice to incorporate discrete data capture of chief complaints and clinical diagnoses. However, the number of distinct data elements for complaints and diagnoses is very large. In this study, we sought to apply data science approaches (including network science and unsupervised machine learning) to identify clusters of complaints and diagnoses in the emergency department (ED).

Methods: We retrospectively analyzed ED admission data from the EHR on 485,000 patient encounters at one of 11 Cleveland Clinic hospitals located in Northeast Ohio during 2018. We implemented a 3-stage analysis approach: *Stage 1 (Data Pre-Processing):* We excluded chief complaints that were present in <500 (0.1%) of encounters. For the diagnoses, which were represented with International Classification of Diseases and Injuries, Version 10 (ICD-10) codes, we designed a recursive algorithm to trim trailing digits off of sparsely- represented codes (<500 encounters) until the aggregated diagnosis codes all represented ≥500 encounters. We did not trim digits from the left side of the decimal point in the ICD-10 codes, and excluded any remaining codes with <500 encounters even after truncating trailing digits (10% of diagnoses). *Stage 2 (Network Construction):* We constructed a directed, fully-connected and weighted network in which any qualifying complaint or aggregated diagnosis (from stage 1) was represented as a node. The weight for the arrow from node A to node B represented the proportion of encounters that listed B among those that listed A. Likewise, a weighted arrow from node B to node A represented the proportion of encounters that listed B among those that listed A. We calculated these weights for every pair of nodes in the network. *Stage 3 (Clustering):* We then ran a network clustering algorithm (called walktrap) to derive similarity scores among nodes in the graph. These similarity scores were then used as inputs to a hierarchical clustering algorithm. Solutions of 10, 20, 50 and 100 clusters were studied and assessed for clinical suitability (balance between granularity and resulting number of clusters).

Results: There were 12,163 distinct ICD-10 diagnosis codes (1,097,390 total) and 1,026 distinct chief complaints (677,123 total) represented in the dataset. There were 20,819 excluded complaints (3.1%) and 110,688 excluded diagnoses (10%) after implementing pre-filtering of the data (stage 1 above). The 100-cluster solution was chosen as the one that best balanced between complexity (number of clusters) and granularity. A sample of four of these clusters is shown in the Figure.

Conclusions: Our algorithm effectively reduced the large number of distinct chief complaints and diagnoses to a manageable and clinically-actionable number of clusters. These clusters can be useful in adapting ED informatics to streamline staffing, triage, treatment and disposition.

UPPER RESPIRATORY CONDITIONS

Complaint/Diagnosis	Encounters N	%
CC: COUGH	24165	20%
CC: FEVER	18414	15%
DX: J069 - Acute upper respiratory infection, unspecified	12141	10%
DX: R05 - Cough	10667	9%
DX: B9789 - Oth viral agents as the cause of diseases classd elsewhr	6863	6%
DX: B349 - Viral infection, unspecified	4972	4%
DX: J40 - Bronchitis, not specified as acute or chronic	4393	4%
DX: J45901 - Unspecified asthma with (acute) exacerbation	3722	3%
CC: NASAL CONGESTION	3590	3%
CC: DIFFICULTY BREATHING	3439	3%
DX: R0981 - Nasal congestion	2692	2%
CC: ASTHMA	2555	2%
DX: J01 - Acute Upper Respiratory Infections	2515	2%
DX: J45 - Chronic Lower Respiratory Diseases	2319	2%
CC: URI	2313	2%
CC: WHEEZING	2063	2%
DX: J4521 - Mild intermittent asthma with (acute) exacerbation	1958	2%
<14 others - 10 diagnoses and 4 complaints>	13493	11%

HEADACHE

Complaint/Diagnosis	Encounters N	%
CC: HEADACHE	19390	49%
DX: R519 - Headache, unspecified	12688	32%
DX: G43 - Episodic And Paroxysmal Disorders	2360	6%
DX: G44 - Episodic And Paroxysmal Disorders	1714	4%
DX: H53 - Visual Disturbances And Blindness	1402	4%
CC: BLURRED VISION	959	2%
CC: FACE PAIN	679	2%

BACK PAIN

Complaint/Diagnosis	Encounters N	%
CC: BACK PAIN	15787	55%
DX: M545 - Low back pain	8501	18%
DX: G8929 - Other chronic pain	6785	14%
CC: LOW BACK PAIN	6275	13%
DX: M546 - Pain in thoracic spine	2127	4%
DX: M541 - Radiculopathy	1992	4%
DX: M549 - Dorsalgia, unspecified	1949	4%
DX: M62 - Disorders Of Muscles	1473	3%
DX: M5441 - Lumbago with sciatica, right side	1417	3%
< 6 others - 4 diagnoses and 2 complaints>	1588	9%

CHEST PAIN

Complaint/Diagnosis	Encounters N	%
CC: CHEST PAIN	33392	15%
CC: SHORTNESS OF BREATH	33003	15%
DX: R079 - Chest pain, unspecified	21320	10%
DX: I10 - Essential (primary) hypertension	16198	8%
DX: R0602 - Shortness of breath	10604	5%
DX: R0789 - Other chest pain	9813	5%
DX: I509 - Heart failure, unspecified	4896	2%
CC: HYPERTENSION	4856	2%
DX: E11 - Diabetes Mellitus	3999	2%
DX: R0600 - Dyspnea, unspecified	3612	2%
DX: Z7901 - Long term (current) use of anticoagulants	3491	2%
DX: Z794 - Long term (current) use of insulin	2645	1%
DX: F17200 - Nicotine dependence, unspecified, uncomplicated	2609	1%
DX: E119 - Type 2 diabetes mellitus without complications	2570	1%
DX: N1830 - Chronic kidney disease, stage 3 unspecified	2289	1%
DX: I480 - Paroxysmal atrial fibrillation	2144	1%
DX: K219 - Gastro-esophageal reflux disease without esophagitis	2143	1%
DX: R9431 - Abnormal electrocardiogram [ECG] [EKG]	2123	1%
DX: R791 - Abnormal coagulation profile	2027	1%
DX: J449 - Chronic obstructive pulmonary disease, unspecified	1979	1%
DX: I503 - Diastolic (congestive) heart failure	1967	1%
DX: E6601 - Morbid (severe) obesity due to excess calories	1957	1%
DX: I2510 - Athscl heart disease of native coronary artery w/o ang p	1949	1%
DX: J90 - Pleural effusion, not elsewhere classified	1903	1%
DX: Z95 - Presence of cardiac and vascular implants and grafts	1886	1%
DX: I502 - Systolic (congestive) heart failure	1807	1%
DX: E785 - Hyperlipidemia, unspecified	1790	1%
DX: I21 - Ischemic Heart Diseases	1445	1%
DX: E66 - Overweight, Obesity And Other Hyperalimentation	1441	1%
DX: I25 - Ischemic Heart Diseases	1369	1%
DX: I160 - Hypertensive urgency	1348	1%
DX: R080 - Elevated blood-pressure reading, w/o diagnosis of htn	1844	1%
DX: E039 - Hypothyroidism, unspecified	1326	1%
DX: I48 - Atrial fibrillation and flutter	1325	1%
DX: R06 - Symptoms And Signs Involving The Circulatory And Respir	1310	1%
DX: F1410 - Cocaine abuse, uncomplicated	1294	1%
DX: I4820 - Chronic atrial fibrillation, unspecified	1206	1%
DX: E782 - Mixed hyperlipidemia	1191	1%
CC: HEARTBURN	502	0%
CC: BLOOD PRESSURE CHECK	389	0%
CC: CHF	170	0%

No, authors do not have interests to disclose

28 Addressing Workplace Violence: Health Care Staff Safety, a Culture of Caring

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Background: Workplace violence (WPV) in health care is an important public health issue and a growing concern in the ED. According to the 2018 Bureau of Labor Statistics, health care and social service industries workers experience the highest rates of injuries caused by WPV; 5 times as likely to suffer a WPV injury as compared to the all-worker incidence rate of 2.1, creating harm and work-related stress and burnout. According to American Nurses Association, "A health care culture that considers workplace violence as part of the job" is the number one barrier to reporting WPV.

Objective: Define WPV, create a multidisciplinary team, increase awareness, formalize reporting process, improve database, and track actionable trends.

Methods: Study data was abstracted retrospectively from 1/2019-12/2021 at an 80K visits ED, 750 bed quaternary hospital; the following variables: unit/department, persons involved (employees, patients, visitors), nature of violence, and time of day. Descriptive statistics and Wilcoxon rank sum test were used. Our Health system and committee adopted the OSHA definition of WPV: any act or threat of physical violence, harassment, intimidation, verbal abuse, or other threatening disruptive behavior that occurs at work. The multidisciplinary team includes Physicians, Nursing, Security, Quality Management, Human Resources, Safety, Patient and Family Centered Care, Patient Care Services, Case Management and Social Work, as well as close collaboration with the System Workforce Safety team. Increased WPV incident reporting was encouraged by embracing a culture of transparency. WPV events were reported to Security, Quality Management, and HR, and collected in an internal database. Data collection processes were improved and drilled down on indicators that could impact the ED specifically.

Results: From 1/2019-12/2021, there were a total of 445 WPV incidents, 85 in the ED (19%) (graph ED incidents/quarter and year). The median number of ED WPV incidents from 2019, 2020, and 2021 was significantly different across the 3 years (the Wilcoxon rank sum test p-value= 0.0317). The rate of ED WPV incidents per 1000 ED visits was: 2019, 0.13; 2020, 0.27; 2021, 0.76; ED volume 84,889, 66,652, and 74,121, respectively. In 2021, 243 WPV incidents reported at the hospital level, and 56 ED incidents (23%), greater than any other location in the hospital. Of the ED WPV incidents in 2021: 78.6% occurred between patients and employees, 19.6% between visitors and employees, and 1.8% between an unknown person and an employee. The nature of violence of ED WPV incidents as follows: 21.4% physical abuse, 25% physical abuse with injury, 30.4% harassment, 17.9% verbal abuse/threats/harassment, and 5.4% sexual harassment. Most WPV incidents occurred between 2am – 4am and 3pm – 11pm.

Conclusions: There was a significant increase of ED WPV incidents reported from 2019 to 2021. We concluded this increase was a result of a combination of factors related to data collection, emphasis on reporting, and factors related to crowding, restrictive visitation policies due to Covid-19, and patient factors. The ED was identified as having a disproportionate number of WPV incidents leading to the decision to place security posts 24/7. The ED WPV committee has also developed a formal debrief process for instances of WPV as well as "Proactive Rounding" with a combination of security and clinical teams.

No, authors do not have interests to disclose

29 Bridge for Meth: Multi-Center Prospective Evaluation of Emergency Department Initiation of Mirtazapine for Problematic Methamphetamine Use

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Study Objectives: To describe the characteristics and clinical outcomes among ED patients treated with mirtazapine for problematic methamphetamine use at 6 EDs participating in the CA Bridge, Centers of Excellence Program (COE).

Methods: Six emergency departments including northern, central, and southern regions of California developed a learning collaborative with weekly meetings to explore potential interventions to improve outcomes for ED patients with problematic methamphetamine use. After review of the available evidence, oral mirtazapine was determined to be a promising treatment to target depressive symptoms and disrupted sleep thought to drive methamphetamine craving. A mirtazapine clinical guidance summary was developed and implemented at each of the 6 participating EDs. Treatment of racing thoughts, agitation or psychosis with an antipsychotic was encouraged before offering mirtazapine. The suggested ED dose was 30mg by mouth followed a 2 week prescription. All patients who received treatment were followed by a dedicated clinical team that included a substance use navigator and physician. Eligibility for mirtazapine treatment was determined by the treating clinical team. Clinicians were encouraged to prescribe an antipsychotic such as olanezpine to be used as needed to promote sleep and calm racing thoughhts and/or paranoia. Patient treatments and clinical outcomes were evaluated on an ongoing basis by the physician site lead and lessons learned shared at weekly COE meetings. For this retrospective analysis, clinical data was abstracted from the electronic medical record and care navigation documentation. Descriptive statistics were performed.

Results: Between September 2021 and April 2022, 53 patients who were diagnosed with problematic methamphetamine use were administered mirtazapine in ED. Most (83%) were male. Age(yrs) was evenly distributed: 20-29 (19%), 30-39 (28%), 40-49 (32%), ≥50 (21%). Self-reported race ethnicity was 15% Black/African American, 15% White, 62% Hispanic/Latino, and 8% other. The most common ED chief complaint was evaluation of a psychiatric complaint (32%); 23% of visits mentioned methamphetamine use as a reason for visit. Mirtazapine was administered per protocol at the 30mg dose at 43 visits (81%) and at a lower 15mg dose at 10 (19%) visits; 51 patients (96%) were provided a mirtazapine prescription. The majority (62%) of patients were also administered an antipsychotic medication during the ED visit, 19 (36%) were also provided a discharge prescription for antipsychotic medications. There were no reported adverse events such as excessive sleepiness or agitation worsened by mirtazapine. Most (89%) of patients were discharged home. At 30 days, (43%) of ED patients initiated on mirtazapine in the ED were engaged in outpatient addiction treatment.

Conclusion: A large diverse group of 6 EDs in California were able to develop and implement a clinical protocol that aimed to initiate medication treatment for problematic methamphetamine use. Co- treatment with an antipscyhotic was common. Among patients who accepted treatment with mirtazapine, engagement in treatment was comparable to that observed among ED patients with opioid use disorder who are treated with buprenorphine. These observations suggest prospective randomized study of ED initiated medications for the treatment of methamphetamine use disorder, such as mirtizapine, is warranted.

No, authors do not have interests to disclose

30 Current Understanding and Relevant Trends in Altitude Illness in Nepal (CURTAIN)

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Study Objectives: The Himalayas in Nepal have long stood as the site for pioneering clinical trials aiming to understand, treat and prevent acute mountain sickness (AMS). AMS is a debilitating malady characterized by headache and a constellation of fatigue, dizziness, and gastrointestinal distress with the potential to

progress to fatal disease. Decades of research has reported a wide range of disease rates from 16-53% in various regions of Nepal. Such variability has provided a challenge for researchers hoping to adequately power altitude research. Additionally, new access to popular trekking regions, recent updates to AMS criteria and more awareness of AMS may have influenced AMS rates. The goal of this study was to re-establish the prevalence of acute mountain sickness in two frequently visited regions of Nepal, the Khumbu Valley and Manang districts, as well as understand trends in demographics, trekking profiles and chemoprophylaxis.

Methods: This was a prospective convenience-sample survey study conducted in two separate locations: Lobuje (4940 m) located along the route to Everest Base Camp, and Manang (3519 m) located along the Annapurna Circuit. Inclusion/exclusion criteria involved any person spending their first night in these locations that had not slept at a higher altitude in the last week. The study was conducted over a period of roughly six weeks from 4/4-5/13/22. AMS was diagnosed according to symptoms scored using the Lake Louise Questionnaire (LLQ). The primary outcome was AMS prevalence defined as LLQ >/= 3, with moderate AMS LLQ > 5. LLQ scores were collected the evening of and morning after ascent, maximum LLQ score was utilized for AMS prevalence. Basic demographic characteristics, trekking profile, chemoprophylaxis and medication data were collected as well.

Results: Basic preliminary results from the initial three weeks of data yielded a total sample size of 1,315. At the Lobuje site, 831 participants completed and returned surveys. Participant age ranged from 9-79, with 39% identifying as female. Individuals from 64 countries were sampled. AMS incidence was 23% with moderate AMS 4%. At the Manang site, 483 individuals returned completed surveys. Participant age ranged from 11- 91 with 35% identifying as female. Individuals from 45 different countries were sampled. AMS incidence was 15% with 3% moderate AMS.

Conclusion: In the first three weeks, this study has become the largest sample size for both the Lobuje and Manang regions of the Nepal Himalayas. Preliminary data indicated a similar and low AMS incidence for the Lobuje and Manang region with a low incidence of moderate AMS. Future statistical analysis will more quantitatively characterize trends and associations. This data can inform AMS prevention campaigns and guide future research studies.

No, authors do not have interests to disclose

EMF 31 Intubatable 3D Printed Airway Manikin: A Feasibility Study for Replicating Real Patient Anatomy

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Background/Objectives: Airway Manikins are commonly used to train physicians in the psychomotor skills associated with intubation; however, manikin anatomy has been shown to be significantly different from patient measurements. While practicing the approach to anatomically difficult airways is of particular value; few commercial products attempt to recreate anatomic variants. For this study, our objective was to use multimodal 3D printing technology to re-create actual patient anatomy in an intubatable airway manikin.

Methods: A retrospective chart review of ED patients at a northeast urban community medical center was performed to generate a set of relevant patient anatomy variants. A query revealed 60,142 ED patients with neck imaging presenting to the ED between 2015 to 2020, of which 252 had CT neck imaging and were intubated. Of these, 66 met criteria for inclusion; various measurements were taken from each image and compared to prior published studies regarding airway anatomy measurements. A selected image from this set was used for the initial print. Anatomic structures with distinct houndsfield intensity (via CT) were isolated and volume rendered segmentations were generated utilizing MimicsTM. Anatomic features were adjusted to account for the anticipated changes in airway size that occur when patients are positioned for intubation and to account for the volume occupied by airway secretions. A commercial model from 7-SigmaTM was utilized as a base for the 3D printed airway structures; a commercial model was used to increase the durability of the resulting airway and lessened the amount of 3D printing materials needed. After renderings were created, engineering features were added to the model to allow integration with this commercial manikin and to provide a hinge mechanism for jaw movement. Anatomic features were assigned material properties based roughly on values in the literature and adjusted to optimize for a realistic feel of manikins during intubation. A Polyjet digital material printer (stratasys J826) was used to print these assemblies with multimaterial properties based on the Agilus series of multimaterial resins allowing for a range of materials properties ranging from ~1 MPa to ~1 GPa.

Results: This approach to utilizing multimodal 3D printing to augment a commercial manikin has generated intubatable manikins based on actual patient anatomy that are currently in testing with trained intubators.

Conclusion: Multimodal 3D printing can be utilized to generate higher fidelity training manikins based on actual patient anatomy. This feasibility study is an example of how this technology can be utilized to enhance training tools for future airway management training.

Yes, authors have interests to disclose

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32 Droperidol on Prevention of Emesis from Cannabinoid Hyperemesis Syndrome (DOPE Study)

Chopra Q, Bolotin T, Noga J, Donley C, Peyko V, Gatchel M, Pugsley B, Bertok A/Bon Secours Mercy Health, Youngstown, Ohio, US

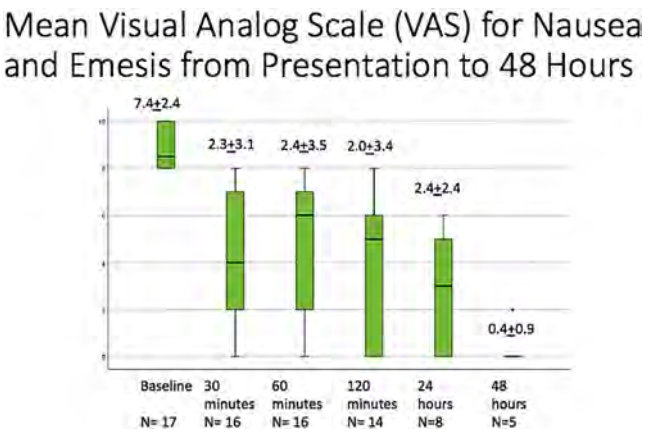
Introduction: Cannabis Hyperemesis Syndrome (CHS) is characterized by persistent nausea, vomiting and abdominal pain with episodes of cyclic vomiting associated with chronic cannabis use. CHS symptoms are difficult to manage and are often refractory to standard first-line antiemetics and analgesics. Recent prospective studies have demonstrated the superiority of haloperidol, a dopamine antagonist, over ondansetron for the treatment of CHS. Interim analysis of our study has determined that droperidol, also a dopamine antagonist, has equal or better efficacy to haloperidol.

Methods: This is a multicenter prospective interventional study compared to a historical cohort. This study is IRB- approved, clinicaltrial.gov registered and university grant funded. Patients were enrolled at four emergency departments. Once enrolled, participants were given a study regimen of droperidol and benadryl. Symptoms of nausea and vomiting, and abdominal pain were measured using a visual analogue scale (VAS) up to 120 minutes. Participants were contacted 24 and 48 hours after discharge for follow up of symptoms. Participants were compared to a retrospective cohort treated in the same institutions with haloperidol for CHS.

Results: Interim analysis with n=17, VAS for nausea and vomiting declined from baseline of 7.4±2.4 to 2.30±3.1 at 30 minutes post treatment ($p < 0.05$), and 2.0±3.4 at 120 minutes ($p < 0.05$). The results with respect to abdominal pain, VAS mean was 7.1±2.3 at baseline with decline to 3.0±2.8 at 30 minutes ($p < 0.05$) and 2.50±3.4 at 120 minutes ($p < 0.05$). Return to the emergency department within 7 days following haloperidol was 32.7%. At this time, there has been 0.0% of enrolled participants who returned to the emergency department with the study regimen.

Discussion/Conclusion: Previous studies have reported fewer rescue medications required, shorter time to discharge, and fewer return visits to the ED with the use of haloperidol for CHS symptoms compared to ondansetron. This trial shows significant improvement in symptoms from baseline as the primary outcome of change after treatment with the study regimen. Also, preliminary data shows decreased time to discharge following treatment with the study regimen compared to haloperidol. Of absolute clinical significance, no participants have yet returned the emergency

department within a week post treatment with the study regimen compared to a third returning in the historical control group.



No, authors do not have interests to disclose

33 Mapping Emergency Department Asthma Visits to Identify Poor Quality Housing

Samuels E, Taylor R, Pendyal A, Shoajee A, Mainardi A, Lemire E, Venkatesh A, Bernstein S, Haber A/Alpert Medical School of Brown University, Providence, Rhode Island, US

Background: Housing conditions are a key driver of asthma incidence and severity. Prior studies have demonstrated increased emergency department (ED) asthma visits among residents living in poor-quality housing. Interventions to improve housing conditions have been shown to reduce asthma ED visits, but identification and remediation of poor housing conditions is often delayed or does not occur. This study evaluates whether ED asthma visits can be used to identify poor quality housing to support proactive and early intervention.

Methods: We conducted a retrospective cohort study of children and adults living in and around New Haven, Connecticut, USA seen for asthma in an urban, tertiary ED from 2013 to 2017. We geocoded and mapped patient addresses to city parcels and calculated a composite asthma ED utilization incidence rate for each parcel. We conducted linear and random forest regression analyses adjusting for neighborhood and individual factors contributing to ED utilization for asthma and evaluated whether there was a correlation between asthma burden and public housing complex inspection scores from standardized home inspections which are conducted every 1 to 3 years on publicly funded housing.

Results: There were 11,429 asthma-related ED visits from 6,366 unique patients in the analysis. Mean patient age was 32·4 years old; most were female (60·3%), over half (57·2%) Medicaid insured, and 41·6% were Black. Asthma ED utilization incidence rates were strongly correlated with lower housing inspection scores (Pearson's R=-0·55, 95% CI: [-0·70, -0·35], p<0.0001, Figure 1A) which persisted after adjustment for patient and neighborhood demographics using linear (R=-0·54, [-0·69, -0·33], p<0·0001, Figure 1B) and non-linear regression models (R=-0·44, [-0·62, -0·21], p=0·0004, Figure 1C). Adjusted asthma incidence rates were elevated above the 90% percentile city-wide on average a year before a housing complex received a failed housing inspection. Sensitivity analysis showed improved performance for larger n (assessed by correlation with minimum HUD inspection score for each parcel) up to a maximum of R=-0·79 (n=10). This indicated that while the model performs well across all parcels, it is most accurate for parcels where many patients are observed.

Conclusion: ED asthma visits are a leading indicator of failed housing inspections approximately a year before a failed housing inspection. This represents a novel method for the early identification of poor housing conditions and may help reduce asthma-related morbidity and mortality.

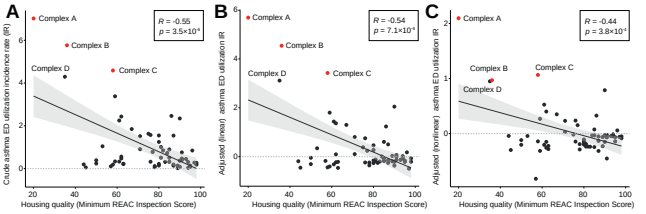


Figure 1. Association of ED asthma visit rates and HUD physical inspection scores. Housing complex-level asthma exacerbation incidence rate estimates are negatively correlated with HUD inspection scores for building condition. Housing complexes with smaller incidence of asthma-related ED visits was correlated with higher building inspection scores. Scatter plots show the minimum REAC inspection score (x-axis) and model risk-estimates for each HUD-subsidized or public housing complex (points) which are sized according to the number of ED patients from that complex (legend, top). Three of the top four incidence rates indicate housing complexes that have since been closed or demolished (red points). (A) are the crude estimated asthma visit rates, (B) are the adjusted linear estimated asthma visit rates, and (C) are the adjusted nonlinear (random forest regression) estimated asthma visit rates.

No, authors do not have interests to disclose

34 A Remote Monitoring Program for Patients Discharged from the Emergency Department With Mild to Moderate COVID-10 Infection

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Study Objectives: Our hospital system initiated a remote monitoring program to provide emergency physicians with a non-admission pathway for COVID-19 patients with either moderate disease or mild disease with risk factors for adverse outcome, respectively. We sought to describe the program and evaluate subsequent admission rates for a cohort of COVID-19 patients enrolled for monitoring.

Study Design/Methods: This was a secondary analysis of a prospectively collected database from 11 facilities within a hospital system. We included consenting, adult patients diagnosed with moderate COVID or mild disease with high risk features that were discharged from the ED from July 2020-September 2021 following enrollment in a remote monitoring program. The treating physician made the disposition and enrollment decisions as well as arrangements for home oxygen at her/his discretion. Patients were ineligible if they did not have a smartphone or tablet with messaging capability. Program managers provided in-person education and follow-up appointment assistance. Within a dedicated app, patients answered questions for the COVID dyspnea survey and self-reported pulse ox and temperature, respectively, twice-a-day. Patients receiving automated medium/high alert messages based on their responses also received in-app messaging and a clinical assessment telephone call. Monitoring was discontinued after 14-days at home or if the patient was directed to return to a hospital. Follow-up phone calls were made to participants to determine if they were admitted to a hospital outside our system. Trained data abstractors recorded patient data into a structured spreadsheet. COVID-related subsequent admission was determined using ICD-10 diagnostic codes. Categorical data was analyzed by chi-square; continuous data by t-tests. We performed a multivariate logistic regression analysis to control for confounding. The primary outcome parameter was to assess the proportion of patients discharged from the ED after enrollment in the program who subsequently returned to the hospital for admission.

Results/Findings: There were 379 patients in the cohort; 53% female, mean age 45.9+/-14 years, 59% Hispanic, and 36% were self-pay. 8.2% of patients enrolled in the monitoring program were subsequently admitted to the hospital, 95% CI [5.8,11]. Bivariate analysis revealed no significant differences for patients who were not subsequently admitted vs. admitted to the hospital with respect to: mean age (45.6+/-14.6 vs. 49.7+/-12.2 years; p=0.13), sex (7.4% vs 8.9%; p= 0.29), race (p=0.061), and insurance type (p=0.71). There was a difference in the admission rate between the 11 hospitals with rates ranging from 3.4% to 16% (p=0.045). Within a multivariate logistic regression model, we found no association between return for admission and the majority of dependent variables. However, the relationship for return admission remained significant with respect to facility and specifically for the two hospitals with the highest admission rates (p= 0.012 and p=0.005 respectively).

Conclusion: Overall, remotely monitored COVID-19 patients within our cohort that were treated and discharged from the ED had a return for admission rate (8.2%) consistent with prior reports for patients without such programs. However, there was

significant variation in performance by facility, and the hospitals with the lowest admission rates were less than suggested by prior investigations.

No, authors do not have interests to disclose

35 Increasing Naloxone Prescriptions Through Electronic Medical Record Best Practice Advisory Alerts

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Study Objectives: Overdoses are now the leading cause of injury-related death in the United States with recent increases influenced by multiple factors including the COVID-19 pandemic. Among the most recent overdose deaths, about 75% involved a prescription or illicit opioid. Naloxone can rapidly reverse fatal overdose and evidence shows reduced mortality when naloxone is available in the community. Although emergency physicians are generally willing to prescribe naloxone to patients at risk of opioid overdoses, prescriptions remain uncommon. We hypothesize that the implementation of a Best Practice Advisory (BPA) alert within the electronic medical record (EMR) can increase the number of naloxone prescriptions given to high risk patients within the emergency department (ED).

Study Design/Methods: In this retrospective chart review, we measured the number of naloxone prescriptions in a 5-month period prior to the initiation of the BPA and compared that to the number of naloxone prescriptions in the 5-month period after the initiation of the BPA. The chart review was inclusive of 9 EDs across a health system with a total annual volume of 450,000 visits per year. We also quantified the total number of BPA triggers and the action taken by the type of ED clinician including physician, resident, physician assistant and nurse practitioner. The BPA was designed to prompt a prescription for naloxone for patients at-risk for opioid overdose that meet criteria including: patients prescribed opioids with comorbidities including chronic lung or heart disease, opioid use disorder, history of opioid overdose, and those with an opioid prescription greater than 50 morphine milligram equivalents per day.

Results/Findings: In the 5-month period after naloxone BPA initiation, there were 740 naloxone prescriptions. This compares to 180 naloxone prescriptions in the 5-month period prior to initiation of the BPA, a 311% increase in naloxone prescriptions after BPA initiation. The BPA fired 2,450 times after initiation and the clinician clicked to "accept" the BPA 1,428, a 58.3% acceptance rate. The rates of ED clinicians clicking "accept" who encountered the naloxone BPA by the type of ED clinician were as follows: physicians (56.5%), residents (67.2%), physician assistants (54.8%), nurse practitioners (42.5%).

Conclusion: Increasing naloxone availability should be considered an important part of a multi-pronged approach to combatting our current opioid epidemic. BPAs within the EMR could be a low-cost, effective intervention to increase naloxone prescription rates for patients at-risk of opioid overdose in the ED. Further investigation is needed to determine pharmacy fill rates of naloxone prescriptions and understand clinician perspectives toward naloxone prescription in order to characterize the most effective model for naloxone distribution.

No, authors do not have interests to disclose

36 Stop the Vomit: Haloperidol as a Superior First-line Antiemetic

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Study Objectives: Nausea and vomiting are common chief complaints when presenting to the emergency department (ED). Ondansetron has become a first-line antiemetic in the ED due to perceived efficacy, safety, and low risk of adverse side-effects despite a lack of substantive evidence of superiority. Haloperidol is a typical antipsychotic medication, acting as a dopamine (D2) antagonist that has efficacy in treating nausea, vomiting, and headache in a variety of ED conditions including migraine headache, cannabis hyperemesis syndrome and diabetic gastroparesis. Our objective is to evaluate the efficacy of haloperidol and ondansetron on undifferentiated nausea and vomiting in ED patients. Secondary outcomes include comparisons of analgesic effects, QT prolongation, efficacy in cannabis users, and adverse side-effects.

Methods: This study is a randomized, double-blind, non-inferiority trial of patients aged 18-55 between April 2021 and March 2022. A convenience sampling of patients meeting inclusion criteria were randomly assigned to either the haloperidol or ondansetron groups. Patients were excluded if any of the following were present: abnormal blood pressure (>200/100mmHg or <90/40mmHg), fever (>100.4F), acute trauma, QT > 450ms on cardiac monitor, altered mental status (GCS < 15), chest pain, allergy to haloperidol or ondansetron, Parkinson's disease, pregnancy or lactation, use of any antiemetic in the previous 8 hours, nausea and vomiting associated with vertigo, prisoners or any wards of the state. Patients were randomized to receive either 2.5mg of haloperidol intravenous (IV) or 4mg IV ondansetron. Symptoms were evaluated at time of enrollment and at 30-, 60-, and 90-minutes post-treatment using a validated Visual Analogue Scale (VAS) with side-effects evaluated concurrently. QT interval was evaluated at enrollment and 90 minutes post- treatment. After 90 minutes, all further treatment was determined by the primary ED physician at their discretion. Patients were contacted after 24 hours to collect follow-up data. Alpha value was set at 0.025 and all results showing non-inferiority were tested for superiority.

Results: Of 384 patients evaluated for inclusion, 312 were excluded due to screening criteria and 48 completed the study. 22 patients were randomized to haloperidol and 26 to ondansetron. Background data, initial nausea, and initial pain scores were statistically similar between groups at enrollment. Haloperidol was found to be superior to ondansetron in treatment of nausea at 90 minutes ($p = 0.0178$) with reduction in median nausea VAS of 6.5 (7 to 0.5) compared to 3 (6 to 3) in the ondansetron group. Haloperidol was also found to be superior to ondansetron in treatment of abdominal pain at 90 minutes ($p = 0.0006$) with reduction in median VAS pain score of 5 (5 to 0) compared to 2.5 (6 to 3.5). No difference in QT interval change was found between haloperidol and ondansetron groups ($p=0.45$). Haloperidol was not found to be superior to ondansetron in reducing nausea in cannabis users ($p = 0.0385$) at 90 minutes post-treatment.

Conclusion: This study presents novel data that haloperidol 2.5mg IV is effective and superior to ondansetron at treating nausea and pain in undifferentiated adult patients in the emergency department. This study also shows that there is no difference in QT prolongation among the two medications.

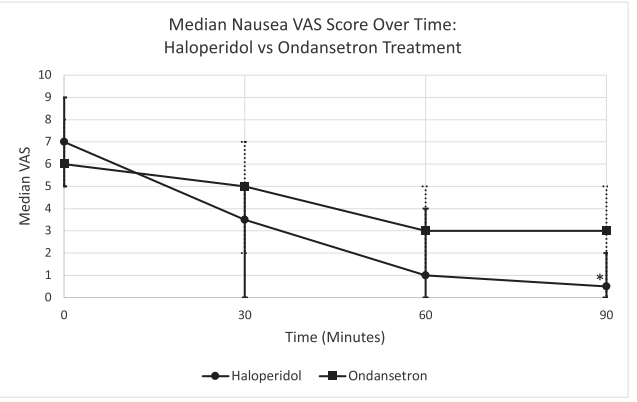

Figure 1. Comparison of haloperidol and ondansetron in the treatment of undifferentiated nausea in the emergency department. Error bars represent upper and lower median quartiles. (*) represents superiority with statistical significance. VAS = visual analog scale.

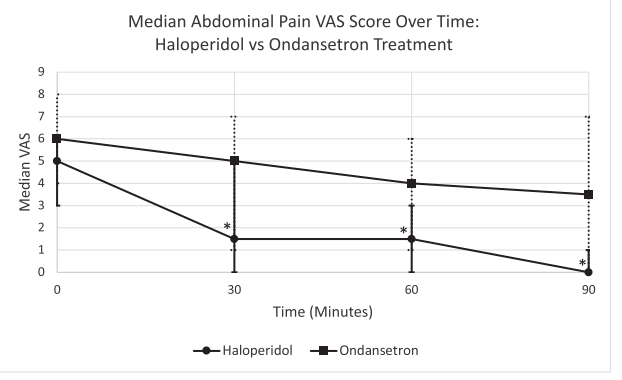

Figure 2. Comparison of haloperidol and ondansetron in the treatment of abdominal pain in the emergency department. Error bars represent upper and lower median quartiles. (*) represents superiority with statistical significance. VAS = visual analog scale.

No, authors do not have interests to disclose

37 Inequities Among Emergency Department Hallway Utilization

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Study Objectives: Emergency department (ED) crowding is a constant and relentless operational challenge facing hospitals across the country. In response to limited capacity, many EDs increasingly care for patients in hallways to provide timely access to ED evaluation. However, hallway placement can also lead to lower patient satisfaction and lower quality of care. We sought to explore social risk factors and ED operations features that may be associated with the hallway placement decision.

Study Design/Methods: Observational retrospective study between July 2017 and February 2020 across two EDs in a health system that sees over 100,000 annual visits. Data extracted included EHR visit data such as age, race, insurance, emergency severity index (ESI), language, zip code as well as ED operational state including time of day/week, ED occupancy, boarding, staffing. Primary outcome was the odds ratio (OR) of the indexed patient being placed in a hallway bed. Secondary outcome was operational factors increasing hallway bed utilization. Since hallway placement occurs at times of ED operational stress, multivariate logistic regression was performed controlling for not only aforementioned patient demographics but also ED operational features when the index patient was placed in a bed. These factors included hallway and regular bed occupancy of ED patients, boarding patients and waiting room census.

Results: 128460 patients were included with 55.4% female and a mean age of 53.7 (Std Dev 19.7). 43939 (34%) patients were placed in a hallway bed. Medicaid (OR 1.05, 95% CI 1.095, 1.005), black (OR 1.039 (1.003, 1.076)), and male (OR 1.11 (1.08,1.14)) patients were more likely to be placed in hallway beds but age was not significant. From an operations perspective, the index patient is more likely to be placed in the hallway when the number of regular beds occupied by boarding patients (OR 1.015 (1.012, 1.017)) is higher and when the index patient has experienced a longer wait time in the waiting room. (OR 1.058 (1.032,1.084)).

Discussion: While the hallway usage is ad hoc, we find consistent inequities with those insured by Medicaid or of black race being placed in hallway beds. EDs should further focus efforts on mitigating conscious and unconscious biases that may influence patient access to emergency care. Consistent with experience, we find that the number of boarding patients and time spent in the waiting room are significant drivers of hallway usage. Further work should examine how new front end processes such as provider in triage or split flow affect inequities in patient placement and not assume that such interventions automatically improve care delivery.

No, authors do not have interests to disclose

38 Resuscitative TEE Collaborative Registry: Development and Implementation of a Multicenter Registry for Focused Transesophageal Echocardiography (TEE) in the Emergency Department and Intensive Care Settings

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Study Objectives: To develop and implement a multicenter registry aimed to evaluate the clinical impact, safety, and clinical outcomes of focused transesophageal echocardiography (TEE) in the evaluation of critically-ill patients in the emergency department (ED) and intensive care units (ICU).

Study Design/Methods: We designed and implemented a prospective, multicenter, observational study involving adult critically-ill patients in whom focused TEE was performed as part of their routine care for the evaluation of out-of-hospital cardiac arrest (OHCA), in-hospital cardiac arrest (IHCA), initial evaluation of undifferentiated shock, hemodynamic monitoring, and/or procedural guidance in the ED, ICU or operating room (OR) setting (NCT04972526). One academic medical center provided operational and research infrastructure including the RedCap Database and a full-time research manager who coordinated onboarding of participating institutions, including execution of data use agreements and facilitation of data entry. An interdisciplinary scientific oversight committee (SOC) involving physicians with clinical and research experience in the field of TEE, developed and refined the data collection instruments, and convened regularly to assess data completeness and quality. The registry database is composed of five instruments evaluating each specific clinical indication of TEE as a specific cohort of patients. Data elements included patient and procedure characteristics (including findings and procedure-related complications), laboratory values, clinical outcomes, timing of interventions, and TEE video images. Utstein cardiac arrest elements were included in OHCA and IHCA patients as well as resuscitation clinical outcomes. A target of 90% reporting from all eligible cases performed in each participating center was established to minimize selection bias.

Results/Findings: During the first year of registry implementation, twenty-three hospitals across four countries were onboarded, including 14 EDs, 5 ICUs, and 1 OR. By May 2022 a total of 310 cases have been collected, including 147 (47%) during OHCA, 43 (13%) IHCA, 92 (30%) initial evaluation of shock, 44 (14%) hemodynamic monitoring, and 38 (12%) procedural guidance. Fifteen centers (65%) entered between 1-9 cases, and 8 centers (35%) entered 10 or more cases. Reporting compliance among centers with $\geq$ 10 cases was 99%.

Conclusion: A prospective, multicenter, and multidisciplinary registry evaluating the use of focused TEE across acute care settings was successfully implemented. This registry will allow to accelerate the development of outcome-oriented research and knowledge translation on the use of TEE in emergency and critical care settings.

Yes, authors have interests to disclose
Disclosure: Fujifilm Sonosite
Consultant/Advisor
Fujifilm Sonosite
Disclosure: Course Director - The Resuscitative TEE Workshop
Other
Course Director - The Resuscitative TEE Workshop

39 Extending Harm Reduction's Reach: Out-of-Hospital Treatment of Opioid Withdrawal via Emergency Medical Service Administered Buprenorphine

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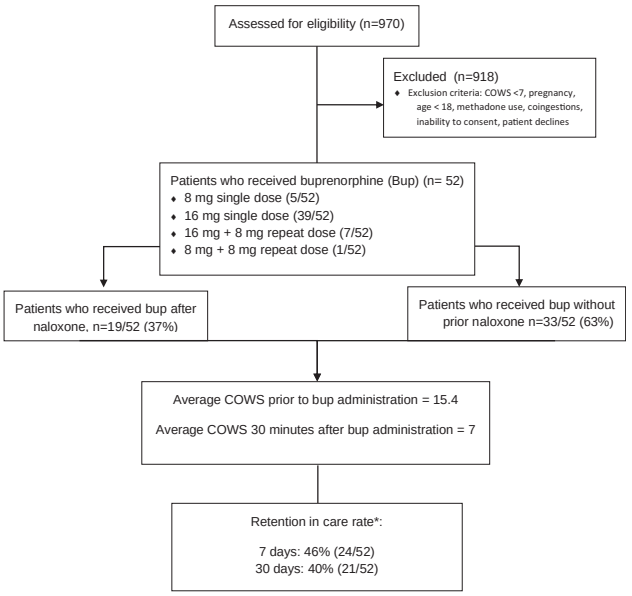
Study Objectives: Out-of-hospital initiation of buprenorphine for opioid withdrawal by paramedics is a promising harm reduction strategy to treat and engage patients at high risk for opioid-related mortality. Patients often decline transport to the hospital when experiencing symptoms of acute opioid withdrawal. Buprenorphine treats the noxious symptoms of opioid withdrawal and is safer than self-treatment by full-agonist opioids (fentanyl, heroin, etc.). The utility of Emergency Medical Service initiated buprenorphine (EMSBUP) for opioid withdrawal requires further investigation. The goal of this study is threefold: to assess the safety of EMSBUP, its effectiveness in treating symptoms of opioid withdrawal in the field, and outpatient engagement with medication for opioid use disorder (MOUD) treatment following EMSBUP.

Methods: This is a retrospective analysis of EMSBUP over a 19-month period in Contra Costa County. The EMSBUP pilot trained approximately 180 paramedics in the identification and treatment of acute opioid withdrawal using the Clinical Opiate Withdrawal Scale (COWS) and buprenorphine. Training consisted of lectures, surveys, case scenarios, practice with the COWS, and motivational interviewing. Patient exclusion criteria for EMSBUP included age under 18, pregnancy, methadone use, altered mental status, severe medical illness, suspected coingestants (ethanol, benzodiazepines, etc.), or inability to comprehend risks/benefits of EMSBUP. Interested patients with a COWS of 7 or greater who met inclusion criteria were offered 8 or 16 mg. of sublingual buprenorphine in consultation with a base hospital physician. Repeat doses of buprenorphine were given to patients with persistent or worsened symptoms 10 minutes after initial administration. Paramedics then calculated a repeat COWS and transported patients to a nearby emergency department (ED) designated as an opioid receiving center. All patients were automatically linked with a Substance Use Navigator (SUN) who arranged follow-up, MOUD prescriptions, and assessed patient engagement at both 7 and 30 days post-intervention.

Results: During the 19-month period of data collection, 52 patients received EMSBUP. Of those treated, only one patient declined transport to the ED. In this sample, 19/52 (37%) patients received naloxone prior to buprenorphine administration. The mean patient COWS score prior to EMSBUP was 15.4, which decreased to 7.1 by 30 minutes post-administration. 52 of 52 patients had follow-up data obtained in the short term. No patients experienced precipitated withdrawal from buprenorphine. The 7 and 30-day retention of care rate was determined by the SUNs and was defined as attending MOUD appointments, self-reports of continued treatment, an active MOUD prescription, or a combination of the three. EMSBUP patients had a 46% (24/52) retention of care rate at 7 days and 40% (21/52) at 30 days. These results are summarized in Figure 1.

Conclusion: EMSBUP in coordination with SUNs at designated opioid receiving centers significantly reduces symptoms of opioid withdrawal in the field, is safe, and links patients at increased risk for opioid overdose to appropriate treatment with high rates of retention at 7 and 30 days.



*The 7 and 30-day retention of care rate was determined by the SUN team and defined as attending Medication-Assisted Treatment (MAT) appointments, self-reports of continued MAT, an active MAT prescription, or a combination of the three.

No, authors do not have interests to disclose

40 30-day Outcomes of Hypertensive Emergency Department Patients Discharged With Antihypertensive Therapy

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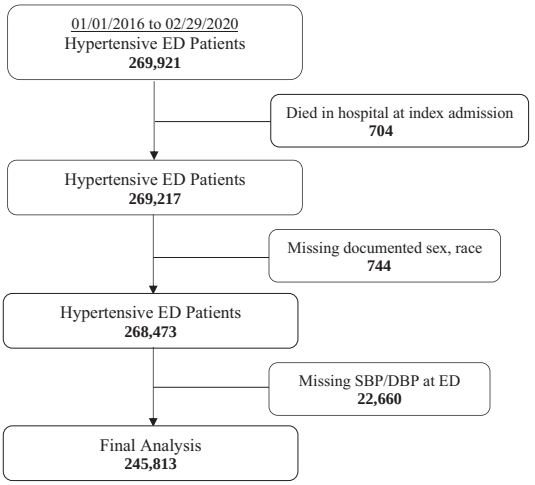
Study Objectives: Hypertension (HTN) is extremely common among emergency department patients (ED) and carries an elevated risk of stroke, myocardial infarction, aortic dissection, hypertensive encephalopathy, and death. Additionally, discharged ED patients with HTN have a high short-term revisit rate to the ED. It is currently unclear if prescribing antihypertensive therapy to discharged ED patients affects their short-term revisit rate or their short-term risk of severe adverse outcomes. We aimed to assess whether ED prescription of oral anti- hypertensive therapy on discharge for hypertensive patients decreases their 30-day risk of the severe adverse outcomes of aortic dissection, hypertensive encephalopathy, heart failure, myocardial infarction, stroke, and death as well as the 30-day risk of ED revisit.

Methods: We conducted a retrospective observational study of discharged ED patients with HTN. The study was conducted at a health system in Michigan comprised of 8 hospitals, 7 of which are community EDs, one of which is a tertiary care center, with a combined 574,591 ED visits in 2019. We included all patients seen and discharged from any ED in the system over the age of 18 with an ED discharge diagnosis of HTN from the dates of January 1, 2016 to February 29, 2020. We excluded patients admitted to the hospital, admitted to an ED observation area, and pediatric patients. Data was collected for age, sex, race, maximum systolic and maximum diastolic blood pressure (BP) during ED visit, Charlson comorbidity index, antihypertensive treatment given in the ED, and discharge ED prescriptions. 30-day post discharge data was also collected for ED revisits, and for the following severe complications: aortic dissection, hypertensive encephalopathy, heart failure, myocardial infarction, stroke, and all-cause death. We assessed the effects of discharge ED antihypertensive prescriptions on ED return and a composite of severe adverse complications within 30 days using a multivariable logistic regression analysis, controlling for patient characteristics.

Results: A total of 245,813 patients were included in our final analysis. 7185 (2.92%) received antihypertensive treatment on discharge. Patients receiving antihypertensive therapy were more likely to be younger, male, Black, to have higher BP, and lower comorbidity index. Prescription antihypertensive therapy was associated with a lower likelihood of severe outcomes (adjusted odds ratio [aOR], 0.69 [95% CI, 0.52 – 0.88], a lower likelihood of heart failure (aOR, 0.65 [95% CI, 0.46 – 0.88]), and a lower likelihood of 30-day ED return (aOR, 0.68 [95% CI, 0.64 – 0.73]. There were 55 cases of aortic dissection and 49 cases of hypertensive encephalopathy in the no-treatment group vs. zero and one respectively in the treatment group, although these findings were not statistically significant.

Conclusion: Antihypertensive treatment for ED patients with HTN is associated with a decreased 30-day likelihood of a severe adverse outcomes and revisit to the ED.

Cohort Selection:



- Descriptive summary of patient characteristics by status of discharge anti-hypertensive medication.

Demographic and clinical characteristics

Variables[§]	All	Discharge Anti-hypertensive Medication		p value
		No	Yes	
n	245813	238628	7185	
Age, years	59.20 ± 16.62	59.39 ± 16.62	52.77 ± 15.22	< 0.001
18 to 40	34654 (14.10)	33055 (13.85)	1599 (22.25)	
41 to 65	122999 (50.04)	118869 (49.81)	4130 (57.48)	< 0.001
≥ 66	88160 (35.86)	86704 (36.33)	1456 (20.26)	
Sex				
Male	101104 (41.13)	97759 (40.97)	3345 (46.56)	< 0.001
Female	144709 (58.87)	140869 (59.03)	3840 (53.44)	
Race				
White/Caucasian	146450 (59.58)	143428 (60.11)	3022 (42.06)	
Black/African American	89139 (36.26)	85285 (35.74)	3854 (53.64)	0.001
Other	10224 (4.16)	9915 (4.16)	309 (4.30)	
SBP[‡], mmHg	151.26 ± 24.65	150.46 ± 24.09	177.84 ± 28.08	< 0.001
≤ 139	85009 (34.58)	84397 (35.37)	612 (8.52)	
140 to 159	81223 (33.04)	79931 (33.50)	1292 (17.98)	< 0.001
≥ 160	79581 (32.37)	74300 (31.14)	5281 (73.50)	
DBP[‡], mmHg	84.28 ± 14.61	83.77 ± 14.21	101.52 ± 16.98	< 0.001
≤ 89	162873 (66.26)	161202 (67.55)	1671 (23.26)	
90 to 99	51348 (20.89)	49636 (20.80)	1712 (23.83)	< 0.001
≥ 100	31592 (12.85)	27790 (11.65)	3802 (52.92)	
Charlson comorbidity index	1.36 ± 2.05	1.38 ± 2.06	0.71 ± 1.48	< 0.001
0	105669 (42.99)	101079 (42.36)	4590 (63.88)	
1	72479 (29.49)	70817 (29.68)	1662 (23.13)	< 0.001
≥ 2	67665 (27.53)	66732 (27.96)	933 (12.99)	
Anti-hypertensive treatment at ED before discharge				
No	225444 (91.71)	222925 (93.42)	2519 (35.06)	< 0.001
Yes	20369 (8.29)	15703 (6.08)	4666 (64.94)	

Abbreviations: SBP=systolic blood pressure; DBP=diastolic blood pressure; ED=emergency department.

[§]For continuous variables, means ± standard deviations were presented. For categorical variables, frequencies (percentages) were presented.
[‡]SBP and DBP were the documented highest measures at ED.

Effect of discharge anti-hypertensive medication on 30-days outcomes

30-days Outcomes [1,4]	All	Discharge Anti-hypertensive Medication: No	Discharge Anti-hypertensive Medication: Yes	Unadjusted OR [Yes vs. No] (95% CI)	p value	Adjusted OR [Yes vs. No] (95% CI)	p value
n	245813	238628	7185				
ED readmission	47860(19.47)	46902 (19.65)	958(13.33)	0.63 (0.59 0.68)	< 0.001	0.68 (0.64 0.73)	< 0.001
Severe composite complications	4169(1.70)	4111 (1.72)	58 (0.81)	0.46 (0.36 0.60)	< 0.001	0.69 (0.52 0.88)	0.003
Aortic dissection[2]	55 (0.02)	55 (0.02)	0 (0.00)	0.30 (0.002 2.07)	0.29	0.15 (0.001 1.05)	0.06
Hypertensive encephalopathy[2]	49 (0.02)	48 (0.02)	1 (0.01)	1.03 (0.12 3.79)	0.97	0.34 (0.04 1.29)	0.13
Heart failure	3139(1.28)	3100 (1.30)	39 (0.54)	0.42 (0.30 0.56)	< 0.001	0.65 (0.46 0.88)	0.005
Myocardial infarction[2]	529 (0.22)	523 (0.22)	6 (0.08)	0.41 (0.17 0.82)	0.01	0.58 (0.24 1.17)	0.14
Stroke[2]	207 (0.08)	198 (0.08)	9 (0.13)	1.59 (0.77 2.88)	0.19	1.66 (0.79 3.10)	0.17
All-cause death[2]	509 (0.21)	505 (0.21)	4 (0.06)	0.30 (0.10 0.66)	0.001	0.60 (0.20 1.36)	0.24

Abbreviations: OR=odds ratio; CI=confidence interval.

[1]Observed frequencies (percentages) were presented. Severe composite complications included any of aortic dissection, hypertensive encephalopathy, heart failure, myocardial infarction, stroke, and all-cause death.
[2]Adjusted odds ratios were estimated by multivariable logistic regression, adjusting for age, sex, race, systolic blood pressure, Charlson comorbidity index.
[3]Odds ratios and the corresponding 95% confidence intervals were based on the profile penalized likelihood. Other estimates were based on the profile likelihood.

No, authors do not have interests to disclose

41 A Nation-Wide Emergency Department Quality Initiative to Improve Care of Patients With Opioid Use Disorder

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Background: To enhance dissemination of resources promoting evidence-based care of emergency department (ED) patients with opioid use disorder (OUD) and assess practices related to OUD care in EDs with a range of characteristics and resources, we developed the ACEP Emergency Medicine Quality Network (E-QUAL) Opioid Initiative. This national ED-focused practice-based learning network seeks to increase provision of naloxone and medication for the treatment of OUD (MOUD) by supporting local quality improvement (QI) through a curated toolkit with webinars and resources, a QI chart review to assess and benchmark ED care, and the dissemination of best practices.

Methods: In March of 2021, participating EDs were requested to complete a structured chart review of 30 randomly selected ED visits between September 2020 - February 2021 (baseline) with ICD-10 codes for opioid overdose or OUD, and to report on the following measures: substance use evaluation in the ED, naloxone offer/provision, MOUD administration (methadone or buprenorphine) in the ED, buprenorphine prescription at discharge, documented overdose prevention or harm reduction provision, and referral to OUD treatment. In November 2021, EDs were requested to review and submit metrics from an additional 30 charts for visits between July 2021- October 2021 (follow-up). Descriptive statistics and student's t tests were used to evaluate differences.

Results: Among the 385 EDs participating in the 2021 E-QUAL Opioid Initiative learning collaborative, the median annual ED visit volume for adults was 14,552, with 138 (36%) classified as rural and 43 (11%) as critical access. Chart review data were submitted for 4,877 ED visits during the baseline period and 5,629 visits during follow-up. Between the baseline and follow-up periods, documented substance use evaluation in the ED increased from 89% to 93% ($p<0.001$) and OUD referral rate increased from 63% to 84% ($p<0.001$). Overall, the discussion or provision of naloxone (34% to 27%; $p<0.001$) and the documentation of overdose prevention and harm reduction counseling (67% to 60%; $p<0.001$) decreased across the two time points, although among the subset of patients with opioid overdose, naloxone discussion/provision increased (36% to 43%; $p<0.001$). Provision of buprenorphine and methadone in the ED (1% to 4%; $p<0.001$) and provision of an outpatient prescription of buprenorphine (2% to 3%; $p<0.05$) increased as well.

Conclusion: EDs participating in a national practice-based learning network demonstrated improvement in several measures of ED OUD care. This study represents the first feasibility assessment of collection of measures from a nationwide sample including rural and community EDs for this purpose. Although improvements are modest, improved rates of OUD evaluation, treatment referral and MOUD treatment provision after participation in an online learning collaborative amidst the COVID-19 pandemic demonstrate the importance and potential for ongoing education and quality improvement.

Yes, authors have interests to disclose

Disclosure: Foundation for Opioid Response (FORE) Foundation

Grant Support

Foundation for Opioid Response (FORE) Foundation

42 Artificial Intelligence Model to Identify Organ Features for Guiding FAST Ultrasound Exams

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Study Objectives: The Focused Assessment with Sonography in Trauma (FAST) exam is used to rapidly identify unstable trauma patients with intraperitoneal hemorrhage. Maintaining high diagnostic precision during a point-of-care FAST Exam requires accurate and prompt recognition of relevant anatomical landmarks. In the cranial abdominal views (right upper quadrant – RUQ, and left upper quadrant – LUQ), these landmarks include solid organs (Spleen, Liver, Kidney) and their interfaces with surrounding structures (the Diaphragm and the inferior tips of the Liver/Spleen). In this study we describe the potential of an Artificial intelligence (AI) model to detect these key organs.

Methods:

Study Design

Single center, prospective, observational study approved by the Institutional Review Board.

Data

Emergency Ultrasound (EUS) fellowship trained emergency physicians acquired cine-loops of FAST exams in non-trauma volunteers (N=11) and trauma patients (N=21) using three transducers (Philips X5-1, S4-1U and C5-2U). The subjects were aged 22-64 years, had a BMI range of 21-34, and 7/32 subjects had positive FAST exams.

Image annotation

Trained annotators labeled each image with bounding boxes around key features (Liver, Spleen, Kidney, Diaphragm, and caudal Liver/Spleen Tip). The annotations were then adjudicated by at least two EUS fellowship-trained physicians. If none of the organs were present, the image was labeled as having insufficient image quality (IQ).

Algorithm

An object detection artificial intelligence (AI) model (YoloV3-Tiny) with low inference time and memory requirements was chosen with the goal of mobile device deployment. The model was trained and tested to classify and localize key organs on individual images. RUQ data consisted of 8652 images from 17 subjects for algorithm training and 2131 images from 3 subjects for testing. LUQ data consisted of 6667 images from 19 subjects for training and 2593 images from 4 subjects for testing. For each organ, the accuracy of the AI predicted bounding box was calculated. True detection occurred if the model correctly predicted the presence of that organ in that image with a sufficient overlap with the human annotated bounding boxes. The acceptable overlap is an Intersection Over Union (IOU) of > 0.5 between the model prediction and human annotation.

Results: The model showed sufficient accuracy > 0.8 for most organs in the RUQ and LUQ (Figure 1a). A trend towards higher accuracy was seen for the RUQ organs as well as for larger organs such as the liver, kidney, and spleen. Furthermore, the model identified insufficient IQ images with high accuracy.

Conclusions: This work demonstrates that a lightweight AI-based organ detection is feasible for FAST exam imagery. Future work will further optimize model performance for diaphragm and liver tip features. The model may enable the realization of passive user guidance by facilitating key organ detection, thereby ensuring exam completeness and accuracy for less trained users including first responders in mass-casualty and combat scenarios.

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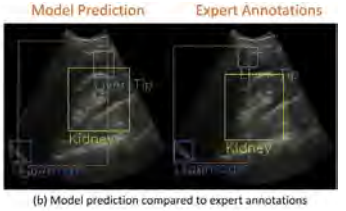
Organ feature	Accuracy (IOU > 0.5)
Liver (RUQ)	0.91
Liver Tip (RUQ)	0.68
Kidney (RUQ)	0.84
Diaphragm (RUQ)	0.56
Spleen (LUQ)	0.82
Spleen Tip (LUQ)	0.83
Kidney (LUQ)	0.8
Diaphragm (LUQ)	0.53
Insufficient IQ	0.96

(a) Organ detection accuracy



(b) Model prediction compared to expert annotations

Figure 1: Model prediction on RUQ and LUQ FAST images. (a) shows organ detection accuracy for RUQ and LUQ FAST images. (b) is an example of the model prediction (left) on test data from the RUQ compared to expert annotations (right).

No, authors do not have interests to disclose

43 Artificial Intelligence Versus Physicians on Interpretation of Printed Electrocardiography Images: Diagnostic Performance for ST-elevation Myocardial Infarction

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Study Objectives: Smartphone-based electrocardiography (ECG) analyzer using camera input can be useful as everyone have it. This study aimed to evaluate whether such a system can outperform clinicians in detecting ST-elevation myocardial infarction (STEMI) regardless of image acquisition conditions.

Methods: We retrospectively enrolled suspected STEMI patients in an emergency department from January to October 2021. A multifaceted cardiovascular assessment system (Quantitative ECG, QCG^{TM}) using ECG images to produce a quantitative score (QCG score, ranging from 0 to 100) was compared to human experts of 7 emergency physicians and 3 cardiologists. Voting scores (number of participants answering "yes" for STEMI) were calculated for comparison. The system's robustness was evaluated using an equivalence test where we prove its performance metric (area under the curve of the receiver operating characteristic curve, AUC-ROC) changes within a predetermined equivalence range (-0.01 to 0.01) in 6 different environments (A combination of three different smartphones and two image sources including computer screen and paper).

Results: 187 patients (96 STEMI, 51.3%) were analyzed. AUC-ROC of QCG score was 0.919 (0.880 – 0.957). AUC-ROCs of voting scores, 0.856 (0.799-0.913) for all clinicians, 0.843 (0.786-0.900) for emergency physicians, 0.817 (0.756-0.877) for cardiologists, and 0.848 (0.790-0.905) for high-performance group were significantly lower compared to that of QCG score. AUC-ROC change by image acquisition condition was negligible with a narrow confidence interval between -0.01 to 0.01 confirming the equivalence.

Conclusion: Image-based AI system can outperform clinicians in STEMI diagnosis and its performance was robust to change in image acquisition conditions.

Table 1. Patient Characteristics (N=187)

	Not-STEMI (N=91)	STEMI (N=96)	Total (N=187)	*p*
Age (mean±SD)	66.0 ± 14.8	62.4 ± 14.5	64.2 ± 14.7	0.104
Sex (n, %)				0.082
Female	28 (30.8%)	18 (18.8%)	46 (24.6%)	
Male	63 (69.2%)	78 (81.2%)	141 (75.4%)	
QCG score (mean±SD)	28.1 ± 31.9	78.3 ± 32.6	53.9 ± 40.8	< 0.001
Laboratory findings (mean±SD)				
CK.MB* (ug/L)	12.1 ± 29.6	19.6 ± 36.1	16.0 ± 33.2	0.123
Troponin-I* (ng/Ml)	2.3 ± 6.3	4.7 ± 8.0	3.5 ± 7.3	0.029
CAG (n, %)	46 (50.5%)	89 (92.7%)	135 (72.2%)	< 0.001
Emergency	21 (23.1%)	89 (92.7%)	110 (58.8%)	< 0.001
Delayed	25 (27.4%)	0 (0.0%)	25 (13.4%)	< 0.001
CAG findings** (n=135)				
Extent of disease (n, %)				
1VD	6 (13.0%)	33 (37.1%)	39 (28.9%)	0.007
2VD	5 (10.9%)	32 (36.0%)	37 (27.4%)	0.004
3VD	18 (39.1%)	22 (24.7%)	40 (29.6%)	0.124
PCI (n, %)	18 (39.1%)	83 (91.2%)	101 (73.7%)	< 0.001
Stented location (n, %)				
RCA	7 (15.2%)	35 (39.3%)	42 (31.1%)	0.008
LCx	2 (4.3%)	14 (15.7%)	16 (11.9%)	0.097
LAD	10 (21.7%)	50 (56.2%)	60 (44.4%)	<0.001
LM	4 (8.7%)	1 (1.1%)	5 (3.7%)	0.084
CABG recommended (n, %)	9 (9.9%)	6 (6.2%)	15 (8.0%)	0.518

QCG, quantitative electrocardiography

* CK-MB < 0.18 was considered as 0.18 and Troponin I >25 was considered as 25 as the limit of the diagnostic test machine measurement value.

**The following information on CAG findings was calculated within the group of patients who underwent CAG (N=135)

Table 2. Performance of the QCG (AI system) and study participants in detecting STEMI on direct screen-capture images

	AUC	P vs. QCG score	AUC (Binned at 50)	P vs. Binned QCG score	Sensitivity	Specificity	PPV	NPV
QCG score	0.919 (0.880 - 0.957)	-	0.839 (0.786 - 0.892)	-	85.4 (78.1-91.7)	82.4 (74.7-90.1)	83.7 (77.7-89.7)	84.3 (77.5-91)
Voting score (All)	0.856 (0.799 - 0.913)	0.004	0.729 (0.668 - 0.790)	<0.001	87.5 (80.2-93.8)	58.2 (47.3-68.1)	68.8 (63.3-74.3)	81.6 (72.9-89.5)
Voting score (EPs)	0.843 (0.786 - 0.900)	0.001	0.763 (0.702 - 0.823)	0.008	84.4 (77.1-90.6)	68.1 (58.2-76.9)	73.7 (67.8-79.8)	80.8 (73.1-88.2)
Voting score (Cardiologists)	0.817 (0.756 - 0.877)	<0.001	0.713 (0.651 - 0.774)	<0.001	86.5 (79.2-92.7)	56 (45.1-65.9)	67.5 (61.9-73.3)	80 (70.7-88.5)
Voting score (AUC- ROC > 0.7)	0.848 (0.790 - 0.905)	<0.001	0.791 (0.732 - 0.849)	0.085	82.3 (74-89.6)	75.8 (67.0-84.6)	78.3 (72.3-84.9)	80.2 (73.2-87.5)

QCG, quantitative electrocardiography; AI, artificial intelligence; EP, emergency physician

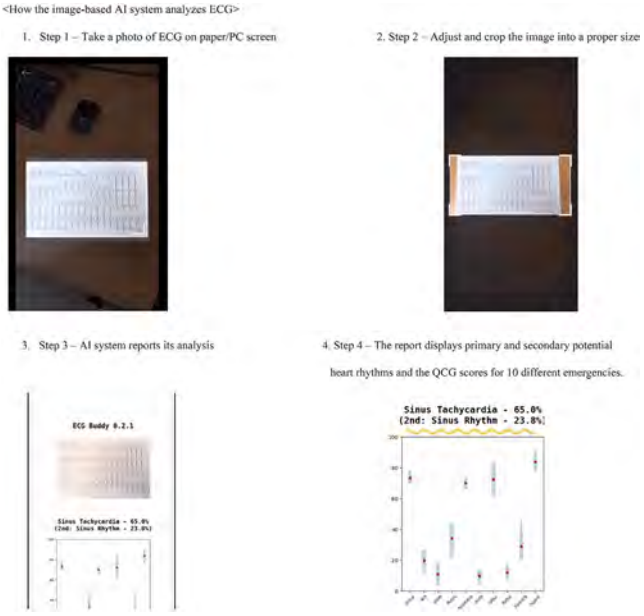
Table 3. QCG performance equivalence evaluation between various ECG image inputs of original images

	Mean difference[1,2]	SD of difference[1,2]	Difference in AUC–ROC (95% CI)	Equivalence
Galaxy phone on PC screen	0.9	2.9	0.00280(-0.00286 - 0.00956)	Confirmed
Galaxy phone on paper	0.5	3.5	0.00183(-0.00452 - 0.00917)	Confirmed
iPhone X on PC screen	1	2.9	0.00092(-0.00424 - 0.00646)	Confirmed
iPhone X on paper	1	2.5	0.00121(-0.00355 - 0.00664)	Confirmed
iPhone 12 mini on PC screen	0.7	2.4	0.00132(-0.00321 - 0.00659)	Confirmed
iPhone 12 mini on paper	0.7	2.7	0.00200(-0.00303 - 0.00784)	Confirmed

PC, personal computer

[1] Difference between the QCG score measurements of the originally captured images

[2] QCG scores ranged from 0 to 100.



Yes, authors have interests to disclose

Disclosure: Joonghee Kim, MD, developed the algorithm and founded a start-up company ARPI Inc. He is the CEO of the company. Eunkyoung Lee works for the company as a part time job data scientist. Otherwise there is no conflict of interest for the other authors. Other Joonghee Kim, MD, developed the algorithm and founded a start-up company ARPI Inc. He is the CEO of the company. Eunkyoung Lee works for the company as a part time job data scientist. Otherwise there is no conflict of interest for the other authors.

44 Prediction of Mortality Among Patients With Isolated Traumatic Brain Injury Using Machine Learning Models in Asian Countries: An International Multicenter Cohort Study

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Study objectives: Traumatic brain injury (TBI) is a significant health care concern in many countries, accounting for a major burden of morbidity, mortality, disability, and socioeconomic losses. Although conventional prognostic models for patients with TBI have been validated, their performance has been limited. Therefore, we aimed to construct machine learning (ML) models to predict clinical outcomes in adult patients with isolated TBI in Asian countries.

Methods: This study used the Pan-Asian Trauma Outcome Study registry, prospectively collected from January 1, 2015, to December 31, 2020. Among 6,540 patients (≥ 15 years) with isolated moderate and severe TBI, 3,276 (50.1%) were included for model evaluation, and 3,264 (49.9%) for model training and validation. Logistic regression as a baseline, and ML models were constructed and evaluated using the area under the precision-recall curve (AUPRC) as the primary outcome metric, area under the receiver operating characteristic curve (AUROC), and precision at fixed levels of recall. The contribution of the variables to the model prediction was measured using the Shapley Additive ExPlanations method.

Results: The ML models outperformed logistic regression in predicting in-hospital mortality. Among the tested models, the gradient-boosted decision tree had the best performance (AUPRC, 0.746 [0.700–0.789]; AUROC, 0.940 [0.929–0.952]). The most powerful contributors to model prediction were the Glasgow Coma Scale, O2 saturation, transfusion, systolic and diastolic blood pressure, body temperature, and age.

Conclusion: Our study demonstrated that ML techniques perform better than conventional multivariate models in predicting outcomes among adult patients with isolated moderate and severe TBI.

Table 1. Baseline characteristics of the study population

	All (n = 6,540)	Survivors (n = 5,717)	Non-survivors (n = 823)	*P* value
Demographics				
Male	4,693 (71.8%)	4,076 (71.3%)	617 (75.0%)	0.032*
Age	57.0 (36.0, 71.0)	56.0 [35.0 – 70.0]	62.0 [48.0 – 75.0]	< 0.001***
Mechanism of injury				
Traffic injury	3,151 (48.2%)	2,693 (47.1%)	458 (55.7%)	< 0.001***
Slip down or fall	2,691 (41.1%)	2,371 (41.5%)	320 (38.9%)	0.169
Struck/hit by person or object	698 (10.7%)	653 (11.4%)	45 (5.5%)	< 0.001***
Pre-existing disability (GOS)				
Vegetative state	67 (1.0%)	40 (0.7%)	27 (3.3%)	< 0.001***
Severe disability	128 (2.0%)	109 (1.9%)	19 (2.3%)	0.520
Moderate disability	522 (8.0%)	478 (8.4%)	44 (5.3%)	0.004**
Mild or no disability	5,708 (87.3%)	5,015 (87.7%)	693 (84.2%)	0.006**
CT findings				
Cerebral contusion	1,577 (24.1%)	1366 (23.9%)	211 (25.6%)	0.294
Skull fracture	847 (13.0%)	707 (12.4%)	140 (17.0%)	< 0.001***
Traumatic cerebral edema	44 (0.7%)	38 (0.7%)	6 (0.7%)	0.987
Traumatic epidural hemorrhage	304 (4.6%)	251 (4.4%)	53 (6.4%)	0.012*
Traumatic subarachnoid hemorrhage	653 (10.0%)	558 (9.8%)	95 (11.5%)	0.125
Traumatic subdural hemorrhage	970 (14.8%)	823 (14.4%)	147 (17.9%)	0.010*
Prehospital variables				
SBP	134.8 (20.5)	134.7 (18.8)	135.5 (29.8)	0.312
SpO2	95.9 (5.9)	96.6 (4.7)	91.4 (9.8)	< 0.001***
Hypoxia (SpO2<90%)	417 (6.4%)	219 (3.8%)	198 (24.1%)	< 0.001***
Hypotension (SBP <90mmHg)	126 (2.0%)	79 (1.4%)	47 (5.7%)	< 0.001***
ED and hospital variables				
SBP	134.0 (29.2)	134.3 (27.1)	131.8 (41.6)	0.026*
Body temperature	36.6 (0.5)	36.6 (0.5)	36.3 (0.7)	< 0.001***
SpO2	96.7 (4.5)	97.2 (3.5)	93.9 (8.3)	< 0.001***
Hypoxia (SpO2<93%)	486 (8.2%)	284 (5.0%)	202 (24.5%)	< 0.001***
Hypotension (SBP <90mmHg)	255 (4.0%)	141 (2.5%)	114 (13.9%)	< 0.001***
GCS score	12.2 (4.1)	13.1 (3.3)	6.0 (3.9)	< 0.001***
Severity score				
Highest AIS score in head				
3	3,850 (58.9%)	3,591 (62.8%)	259 (31.5%)	< 0.001***
4	2,269 (34.7%)	1,952 (34.1%)	317 (38.5%)	0.015*
5	421 (6.4%)	174 (3.0%)	247 (30.0%)	< 0.001***
ISS	11.1 (5.5)	10.5 (4.8)	15.6 (7.6)	< 0.001***
NISS	14.5 (9.2)	13.4 (7.9)	22.2 (13.2)	< 0.001***

Values are represented as n (%), mean (SD), or median (IQR).

*P<0.05, **P<0.01, ***P<0.001.

Abbreviations: AIS, Abbreviated Injury Scale; ED, emergency department; GCS, Glasgow Coma Scale; GOS, Glasgow Outcome Score; ISS, Injury Severity Score; NISS, New Injury Severity Score; SBP, systolic blood pressure; SpO2, oxygen saturation.

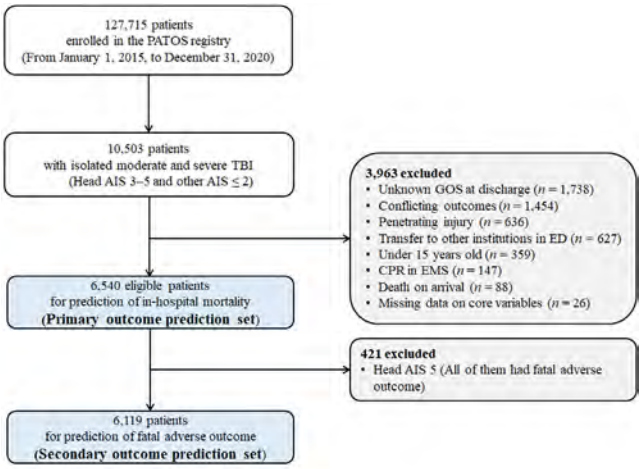

Fig. 1 Flowchart of the study population.

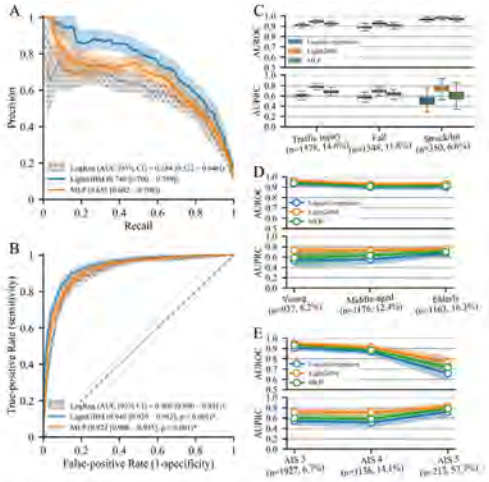

Fig. 2 Overall performance for prediction of mortality. **A, B,** Precision-recall curves (A) and receiver operating characteristics curves (B) on entire test set. Solid lines and shades represent mean curves and 95% confidence interval areas, respectively. For baseline model (logistic regression, "LogReg"), confidence intervals are represented with a polka dot pattern. **B,** An asterisk (*) indicates significantly higher area under the receiver operating characteristics curve (AUROC) than the baseline model ($P < 0.05$, Benjamini–Hochberg corrected). **C, D, E,** AUROC and area under the precision-recall curve on different subgroups. The notation (n = a, b%) under each name of a subgroup indicates the number of samples in test set (a) and mortality rate (b) of the subgroup. **C,** Box plots are plotted with whiskers of 1.5 times the interquartile ranges. **D, E,** Mean values and 95% confidence intervals are represented with solid lines and shades.

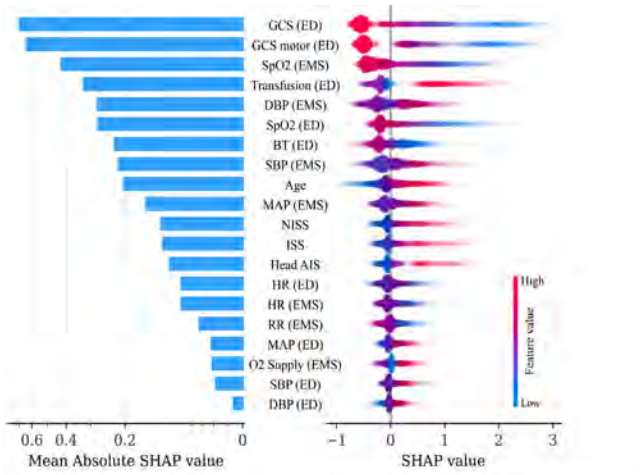

Fig. 3 Importance of the selected variables. Individual influences of every value and overall contributions to the model prediction of each variable are represented as a dot in the right and as a bar in the left, respectively. In the plot on the right, red dots indicate high feature values in continuous/ordinal variables or affirmative responses in binary variables. Positive and negative SHAP values indicate positive contributions resulting in increasing prediction score and negative contributions resulting in lowering prediction score, respectively. Abbreviations: BT, body temperature; DBP, diastolic blood pressure; ED, emergency department; EMS, emergency medical services; GCS, Glasgow Coma Scale; HR, heart rate; ISS, Injury Severity Score; MAP, mean arterial pressure; NISS, New Injury Severity Score; RR, respiratory rate; SBP, systolic blood pressure; SpO2, saturation of percutaneous oxygen.

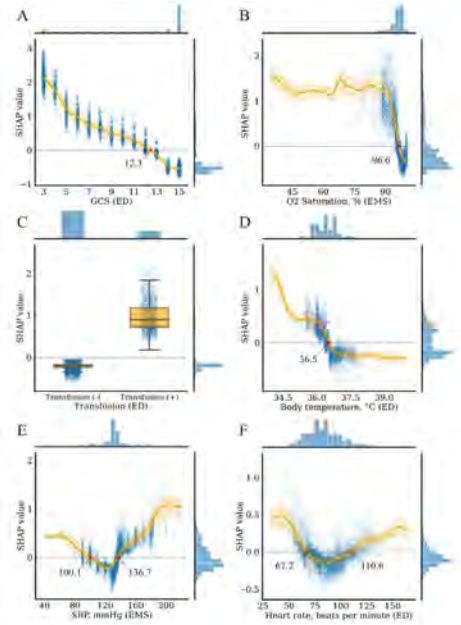

Fig. 4 Partial SHAP dependence plots for six representative variables for prediction of mortality. Histograms on the right and the top axes of each plot indicate distributions of SHAP and variable values, respectively. **A, C, D, E, F,** Scatter plots with regression lines represented with orange lines of mean and shades of SD are illustrated for continuous variables. Red diamonds represent cut-off values. **B,** Scatter plots with box plots with whiskers of 1.5 times the interquartile ranges are illustrated for categorical variables. Abbreviations: ED, emergency department; EMS, emergency medical services; GCS, Glasgow Coma Scale; SBP, systolic blood pressure.

No, authors do not have interests to disclose

45 Association Between Compliance With an Organized State Burn Triage Center and Burn Outcomes

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Background: Burns are time-sensitive injuries associated with significant morbidity and mortality. Delays in treatment can lead to prolonged hospital stays, unnecessary transfers, increased mortality, and added costs. In 2019, an effort to improve statewide burn care led by the Louisiana burn centers' medical directors collaborating with emergency physicians and the Louisiana Emergency Response Network (LERN), established statewide out-of-hospital care guidelines as well as routing guidelines based on criteria from the American Burn Association Burn (ABA). Burn-injured patient transfers were tracked in the subsequent years to assess the effectiveness of burn injury routing algorithms.

Study Objectives: To determine the statewide impact of the new LERN routing algorithm on the transfer rates of burn patients and quantify potentially associated cost savings.

Study Methods: Our study is a statewide review of central coordination center records for burn-injured patients between 01/2021 and 12/2021. Secondary transfers were defined as patients who required transfer from one hospital to another with burn capabilities. A chi-squared statistical analysis was performed. The associated transfer costs were also analyzed using available estimates for ground and air ambulances and length of stay data was queried from a statewide administrative database for years before and after routing.

Results: LERN directed 207 burn patients to facilities for further treatment during the study period, with 177 of the 207 going through the LERN call center in the out-of-hospital setting. Of those 177, only 5% of secondary transfers occurred when LERN's routing recommendation was followed, versus a 35% transfer rate when the ambulance or patient did not follow LERN's direction ($p<.001$). The estimated cost of a ground ambulance transfer in Louisiana includes a base fee of $2,700 with a transportation fee of $33/mile. Additionally, most burn injuries occur within 98 miles of a burn center in Louisiana. In 2020, the average base cost of a rotary- wing air ambulance was $30,446 thus savings ranged from $5,934-$30,446/patient. The median length of stay decreased 11.8 to 8.8 days when comparing all pre-routing and post-routing burn admissions in Louisiana.

Conclusion: Today, only 2% of hospitals have a burn center which creates a challenge for emergency medicine and out-of-hospital providers. LERN-facilitated routing using the ABA criteria resulted in decreased secondary transfers and savings from both a transfer and admitted length of stay perspective. Decreasing the need for secondary transfers reduces delays in burn care, thus enabling burn-injured patients to receive specialized urgent care while also reducing unnecessary secondary EMS transfers and ED visits. Our study is the first to demonstrate the impact of a statewide initiative to improve burn outcomes through out-of-hospital routing. Additional research should incorporate ABA Burn Care Quality Program (BCQP) outcomes data to better distinguish patterns and potential opportunities for improvement.

No, authors do not have interests to disclose

46 The Effect of Mechanical Chest Compression Device on Survival After Out-of-Hospital Cardiac Arrest According to Patient Transport Interval: A Multi-center Observational Study

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Study Objectives: This study aimed to investigate the effect of mechanical chest compression device (MCPRD) on patients with OHCA according to patient transport interval (PTI). We hypothesized that MCPRD is effective on survival with prolonged PTI compared with manual chest compression (non-MCPRD).

Methods: This cross-sectional multicenter observational study using the Korean Cardiac Arrest Research Consortium registry data from 2015 to 2019. Emergency medical service (EMS) treated OHCAs presumed of cardiac etiology without return of spontaneous circulation (ROSC) at scene were included. Exposure was out-of-hospital MCPRD use and PTI. The main outcome was survival to admission. PTI was categorized into three groups; short PTI for 0-5 minutes, intermediate for 6-10 minutes and long PTI for over 10 minutes, respectively. Multivariable logistic regression was performed to estimate the adjusted odds ratios (AORs) and its' corresponding 95% confidence intervals (95% CI) for the effect of MCPRD compared with manual compression on outcome. Interaction of PTI on the effect of MCPRD on outcome were tested. To control for selection bias and confounding factors, propensity score (PS) matched cohort was extracted. PS score for each patient to receive MCPRD was estimated using a multivariable logistic regression model. To reduce the standard error of MCPRD on outcomes, a two-to-one propensity score matched cohort was extracted.

Results: For unmatched cohort, a total of 3,530 patients were eligible and after PS matching, a total of 2,049 patients were eligible for the analysis. The MCPRD was applied at 19.3% of all unmatched cohort. After adjusting for potential confounders, the AOR of MCPRD for survival to admission was 1.36 (95% CI 1.07- 1.72) for unmatched cohort and 1.37 (95% CI 1.06-1.78) for PS matched cohort. Interaction according to PTI on the effect of MCPRD was significant at prolonged PTI on both cohorts; AOR 1.60 (95% CI 1.06-2.42) for unmatched cohort and AOR 1.60 (95% CI 1.06-2.42) for PS matched cohort, respectively.

Conclusion: For patients with OHCA with PTI longer than 10 minutes, MCPRD use showed a significant survival benefit compared with manual chest compressions. Further studies are needed to evaluate the appropriate use of MCPRD in special situations.

Table 1. Demographic findings of study participants of unmatched and propensity score matched cohorts

	Total (Unmatched)		Manual		MCPRD		Total (PS match)		Manual		MCPRD	
	N	%	N	%	N	%	N	%	N	%	N	%
All	3,530	100.0	2,847	100.0	683	100.0	2,049	100.0	1,366	100.0	683	100.0
Sex												
Male	2,256	63.9	1,801	63.3	455	66.6	1,365	66.7	910	66.7	455	66.6
Age												
	73	60-81	73	59-81	75	61-82						
18≤age<30	61	1.7	55	1.9	6	0.9	16	0.8	10	0.7	6	0.9
30≤age<40	96	2.7	73	2.6	23	3.4	69	3.4	46	3.4	23	3.4
30≤age<40	262	7.4	217	7.6	45	6.6	152	7.4	107	7.8	45	6.6
40≤age<50	459	13.0	379	13.3	80	11.7	244	11.9	164	12.0	80	11.7
50≤age<60	596	16.9	495	17.4	101	14.8	297	14.5	196	14.4	101	14.8
60≤age<70	1,031	29.2	828	29.1	203	29.7	619	30.2	416	30.5	203	29.7
70≤age<80	1,025	29.0	800	28.1	225	32.9	652	31.8	427	31.3	225	32.9
age 80 and over	61	1.7	55	1.9	6	0.9	16	0.8	10	0.7	6	0.9
Comorbidities												
Hypertension	1,443	40.9	1,147	40.3	296	43.3	878	42.9	582	42.6	296	43.3
Diabetes	956	27.1	766	26.9	190	27.8	573	28.0	383	28.0	190	27.8
Witnessed	1,950	55.2	1,615	56.7	335	49.1	1,017	49.6	682	49.9	335	49.1
Public Witnessed	3105	88.0	2444	85.8	661	96.8	1,974	96.3	1313	96.1	661	96.8
Bystander CPR	1,852	52.5	1,429	50.2	423	61.9	1,265	61.7	842	61.6	423	61.9
Arrest place												
Public	652	18.5	548	19.3	104	15.2	298	14.5	194	14.2	104	15.2
Initial ECG												
Shockable	406	11.5	328	11.5	78	11.4	233	11.4	155	11.4	78	11.4
Prehospital advanced airway												
Yes	2,604	73.8	1,978	69.5	626	91.7	1,882	91.9	1,256	92.0	626	91.7
EMS defibrillation	604	17.1	492	17.3	112	16.4	328	16.0	216	15.8	112	16.4
EMS response time, median (IQR), mins.	7	5-9	7	5-10	6	5-9	7	5-9	7	5-9	6	5-9
Scene time, median (IQR), mins.	13	9-18	12	8-17	15	12-19	15	11-20	15	11-20	15	12-19
Survival to admission	656	18.6	530	18.6	126	18.5	325	15.9	199	14.6	126	18.5
Hospital ROSC	966	27.4	767	26.9	199	29.1	509	24.8	310	22.7	199	29.1

MCPRD, mechanical chest compression device; PS, propensity score; CPR, cardiopulmonary resuscitation; ECG, electrocardiography; IQR, interquartile range; ROSC, return of spontaneous circulation.

Table 2. Outcomes of subgroups by patient transport interval from unmatched and PS matched cohort

		Total		Manual CPR		MCPRD	
		N	%	N	%	N	%
Unmatched cohort							
Total		3,530	100.0	2,847	100.0	683	100.0
Survival to admission		656	18.6	530	18.6	126	18.4
	Patient transport interval						
	short PTI	88	21.1	79	23.0	9	12.2
	Intermediate PTI	297	18.6	237	18.6	60	18.8
	Long PTI	271	17.9	214	17.4	57	19.7
Hospital ROSC		966	27.4	767	26.9	199	29.1
	Patient transport interval						
	short PTI	124	29.7	103	30.0	21	28.4
	Intermediate PTI	442	27.7	354	27.7	88	27.6
	Long PTI	400	26.4	310	25.2	90	31.0
PS matched cohort							
Total		2,049	100.0	1,366	100.0	683	100.0
Survival to admission		325	15.9	199	14.6	126	18.4
	Patient transport interval						
	short PTI	42	17.4	33	19.6	9	12.2
	Intermediate PTI	159	16.3	99	15.1	60	18.8
	Long PTI	124	14.9	67	12.3	57	19.7
Hospital ROSC		509	24.8	310	22.7	199	29.1
	Patient transport interval						
	short PTI	60	24.8	39	23.2	21	28.4
	Intermediate PTI	251	25.8	163	24.9	88	27.6
	Long PTI	198	23.7	108	19.9	90	31.0

MCPRD, mechanical chest compression device; CPR, cardiopulmonary resuscitation; PTI, patient transport interval; ROSC, return of spontaneous circulation.

Table 3. Multivariable logistic regression model analyzing the relationship between mechanical chest compression device and outcomes

		Survival to admission		Hospital ROSC	
		Odds ratio	95% CI	Odds ratio	95% CI
Unmatched	Model 1	0.99	0.80-1.23	1.12	0.93-1.34
cohort	Model 2	1.36	1.07-1.72	1.47	1.20-1.79
PS matched	Model 1	1.33	1.04-1.70	1.40	1.14-1.72
cohort	Model 2	1.37	1.06-1.78	1.46	1.17-1.81

ROSC, return of spontaneous circulation; CI, confidence interval; PS, propensity score.

Model 1: Unadjusted

Model 2: Adjusted for age, sex, hypertension, diabetes, witness status, public witnessed, bystander CPR, arrest place, initial ECG rhythm, prehospital EMS advanced airway, EMS defibrillation, EMS response time, scene resuscitation time.

Table 4. Model examining interactions of patient transport interval on the effect of mechanical chest compression device on outcomes of unmatched and PS matched cohort.

	Survival to admission		Hospital ROSC	
	AOR*	95%CI	AOR*	95%CI
Unmatched cohort				
Patient transport interval				
Short (0-5mins.)	0.55	0.24-1.26	1.33	0.70-2.51
Intermediate (6-10mins)	1.36	0.94-1.97	1.15	0.84-1.58
Long (over 11mins)	1.60	1.06-2.42	1.75	1.24-2.46
PS matched cohort				
Patient transport interval				
Short (0-5mins.)	0.51	0.22-1.18	1.43	0.75-2.73
Intermediate (6-10mins)	1.42	0.97-2.07	1.24	0.90-1.70
Long (over 11mins)	1.60	1.06-2.42	1.80	1.28-2.53

ROSC, return of spontaneous circulation; AOR, adjusted odds ratio; CI, confidence interval; PS, propensity score.

*Adjusted for age, gender, hypertension, diabetes, arrest place, witness, public witness, bystander CPR, initial ECG rhythm, prehospital advanced airway, EMS defibrillation. EMS response time, on scene time and interaction term (patient transport interval*mechanical chest compression device).

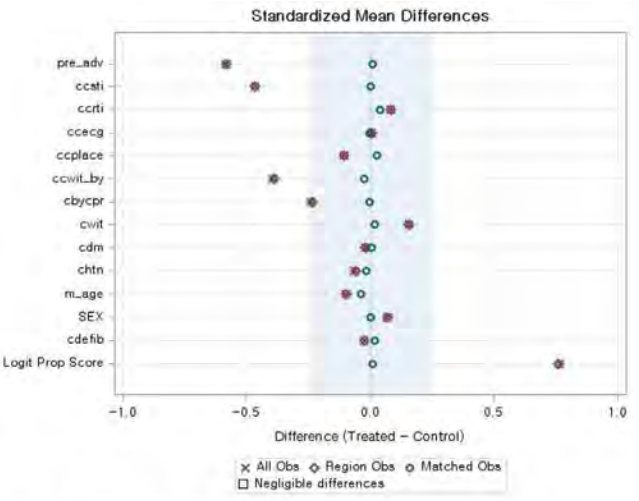

Figure 1. Distribution of standardized mean differences between matched observations.

No, authors do not have interests to disclose

47 A Host Protein Test Based on TRAIL, IP-10 and CRP for Differentiating Between Bacterial and Viral Infection Has Potential to Improve Patient Selection for Blood Culture Utilization

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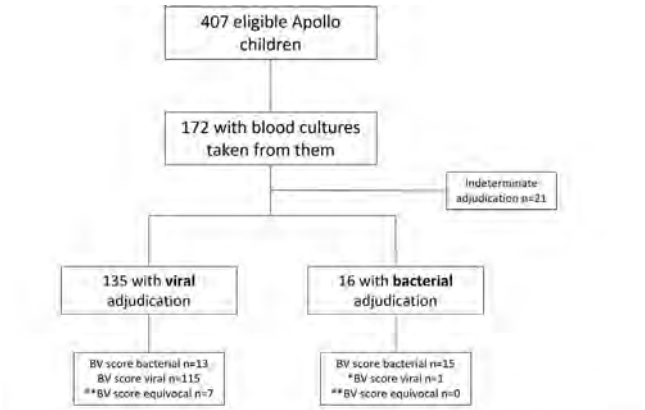
Background: Blood cultures can be useful in the diagnosis and management of patients with suspected infection. They are often utilized, even though their impact on

patient management is coming into question. Since this test is resource intensive and associated with contamination rates that can range from 0.6% to 33% and potentially trigger unwarranted antibiotic treatment, there is increasing awareness of the need to select the appropriate patients for testing. BV, a score for differentiating between bacterial and viral etiologies, is based on computational integration of the blood levels of three proteins (TRAIL, IP-10, CRP). Here we evaluate its diagnostic accuracy in children who had blood cultures taken during their evaluation in the emergency department (ED).

Methods: This study is a sub-analysis of febrile pediatric patients (≤18 years) recruited in the Apollo study (NCT04690569) who had blood cultures taken as part of routine care in the ED. Reference standard etiology was based on adjudication by experts provided with comprehensive patient data including follow-up data but blinded to the BV (MeMed BV®) results. A bacterial or viral reference standard required that at least 2/3 experts assigned the same etiology label with a confidence ≥90% or all 3 assigned with a confidence ≥70%. Indeterminate cases did not meet these criteria. BV is interpreted based on pre-defined score thresholds, $0 \leq$ score < 35 indicates viral (or other non-bacterial) infection, $35 \leq$ score ≤ 65 indicates equivocal and $65 <$ score ≤ 100 indicates bacterial infection (or co-infection). BV performance was assessed against the reference standard with indeterminate cases removed.

Results: Among 407 children enrolled, 172 had blood cultures taken as part of their ED evaluation. The median age was 2.3 years (interquartile range: 1.3-4.9 years), 47.7% were female, and 72.1% were admitted with a median duration of 4 days (interquartile range: 3-5.3 days). The reference standard etiologies were 135 viral, 16 bacterial and 21 indeterminate cases. BV yielded a sensitivity of 93.8% (95% confidence interval: 69.8%-99.8%), specificity of 89.8% (95% CI: 83.3%-94.5%) and negative predictive value of 99.1% (95% CI: 94.5%-99.9%), with 4.6% equivocal cases. Out of the 135 reference standard viral cases, 130 blood cultures were negative and 5 were positive; each considered as contamination. Considering the 151 children with bacterial or viral reference standard, assuming a viral BV score would trigger a change in practice (ie, no blood culture would be run by the laboratory), and an equivocal score would not impact practice, BV potentially reduces the number of blood cultures from 151 to 35 (76.8%). One case (0.7%) received a viral BV score and was reference standard a bacterial infection (false negative) and is addressed in the legend.

Conclusion: BV differentiates bacterial from viral etiology in children for whom blood culture was taken during their ED evaluation. The test has the potential to improve patient selection for blood culture testing in the acute care settings, raising the possibility of reducing laboratory burden as the laboratory could abort processing a culture order when the BV test yields a viral result.



*This was a 2-year-old child presenting with fever, cough and a swelling of the left eye. Physical exam demonstrated an edematous left eyelid, without discharge. The patient was diagnosed with periorbital cellulitis and influenza, admitted for intravenous antibiotics and discharged after 6 days with continued oral antibiotics. Blood culture was negative, and patient did well on follow up

**Equivocal scores represent valid test results but do not provide etiological information.

Yes, authors have interests to disclose

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Investigator
MeMed Diagnostics - Payment made to institute for conduct of the Apollo study
Disclosure: MeMed Diagnostics - Payment made to institute for conduct of the AutoPilot study
Investigator
MeMed Diagnostics - Payment made to institute for conduct of the AutoPilot study
Disclosure: MeMed Diagnostics - Compensated for his time
Consultant/Advisor
MeMed Diagnostics - Compensated for his time

48 COVID-19 and H1N1 Pneumonia: Reanalysis and Comparison of Two Cohorts

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Background: Influenza A H1N1 and SARS-CoV2 have been responsible for important viral respiratory disease epidemics in the 21st century. Both diseases (H1N1 flu and COVID-19) usually present with upper respiratory infection and may evolve into pneumonia. This study evaluated similarities and differences between these viral epidemics in hospitalized patients.

Methods: This is a reanalysis of retrospectively enrolled cohorts in a tertiary hospital (in São Paulo, Brazil) during two different types of viral respiratory epidemics. All RT-PCR confirmed H1N1 patients originally enrolled from July 12 to August 17, 2009 were included. We paired these patients by sex and age 1:1 using propensity score matching with our COVID-19 database of patients, which includes RT-PCR confirmed COVID-19 patients from March 2020 to March 2021. The primary outcome was hospital death. We analyzed the following variables as secondary outcomes: ICU care, ICU length of stay, signs and symptoms at admission, vitals at admission and 72h blood tests. We used R software version 4.2.0 for statistical analysis (significance at 0.05).

Results: We included 52 H1N1 patients and 52 matched COVID-19 patients. Enrolled patients were on average 41 years old and 41% were female. Regarding the primary outcome, hospital death was more common for COVID-19 patients (10% vs 31%, p=0.007). ICU care was more common for COVID-19 patients (52% vs 89%, p<0.001), and ICU stay was longer for them (1 vs 10 days, p<0.001). Cold symptoms, including fever (92% vs 65%, p=0.001), sputum (25% vs 4%, p=0.003), coryza (79% vs 19%, p<0.001) and odynophagia (39% vs 11%, p=0.002) were more common in H1N1 patients. There was no difference in heart (100 vs 98, p=0.738) or respiratory (28 vs 26, p=0.284) rate, but peripheral oxygen saturation (90% vs 93,5%, p<0.001), systolic (110 vs 129, p=0.039) and diastolic (61.3 vs 75.5, p=0.011) blood pressure were higher in COVID-19 patients at admission. 72-hour blood tests showed higher leukocytes (7055 vs 8975, p=0.037) and c-reactive protein (72 vs 167, p<0.001) in COVID-19 patients but higher lymphocytes (1100 vs 975, p=0.022), hematocrit (39.5 vs. 34.45, p=0.028), and lactic dehydrogenase (668.5 vs 436, p<0.001) in H1N1 patients. Finally, there was no difference in platelet (182000 vs 200500, p=0.265) or creatine phosphokinase (117 vs 112, p=0.969) levels.

Discussion & Conclusions: These results reveal that H1N1 and COVID-19 present very different clinical conditions and exam results. On the one hand, H1N1 presented much closer to an influenza-like illness than COVID-19. On the other hand, COVID-19 had a rate of ICU admission with longer stays and higher mortality. These findings are despite H1N1 patients having worse initial vitals with lower blood pressures and peripheral oxygen saturation. Considering COVID-19 may become an endemic variety of respiratory virus, knowledge of different presentations and lab profiles will make it easier to classify disease probability in patients coming to the emergency department.

Trial Registration: This study was registered as RBR-5d4dj5 at ensaiosclinicos.gov.br

Funding: FAPESP and the hospital in which the study was conducted funded this study.

Ethical approval and informed consent: The study protocol was approved by the local Ethics Committee (opinion number 3.990.817; CAAE: 30417520.0.0000.0068), which waived the need for written informed consent.

We adhere to STROBE guidelines.

No, authors do not have interests to disclose

49 Comparing the Safety and Efficacy of a Rapid High-Sensitivity Cardiac Troponin I Protocol Between Hospital-Based and Free-Standing Emergency Departments

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Study Objectives: Significant variability exists in patient population and diagnostic capabilities of large academic tertiary, community-based hospital, and free-standing emergency departments (ED). Current high sensitivity cardiac troponin I (hs-cTnI) research has been conducted almost exclusively in hospital-based ED (HBED) settings and the translation of these protocols into the free-standing EDs (FSED) has yet to be explored. This study compared the safety, efficacy, and ED throughput of applying a 0/1-hour, rapid-rule out protocol using hs-cTnI for exclusion of acute myocardial infarction (AMI) in HBEDs and FSEDs.

Methods: This was a pre-planned, secondary analysis of a stepped wedge cluster randomized trial of patients evaluated for possible AMI in 9 EDs in an integrated health system from July 2020 through March of 2021. Five of the EDs were HBEDs and four were FSEDs. The trial arms included a new 0/1-hour rapid protocol using hs-cTnI versus standard care, which used a 0/3-hour protocol without reporting hs-cTnI values below the 99th percentile. All adult ED patients were eligible if the treating clinician ordered an ECG and cardiac troponin. We excluded patients with STEMI, a hs-cTnI >18 ng/L in the ED, or a traumatic cause of symptoms. The primary outcome was safe ED discharge, defined as discharge with no death or AMI within 30-days. Analysis included a mixed effect model adjusting for ED site, time, sex, age, and race. We report adjusted odds ratios (aOR).

Results: The trial included 32,609 patients, of whom 26,957 were seen in HBEDs and 5,652 were seen in FSEDs. Safe discharge from HBED occurred 53% (5947/11,062) of the time in the standard care arm and 50.4% (8,005/15894) under the rapid rule-out protocol (aOR 1.04, 95% CI 0.94 – 1.15, p = 0.5). Safe discharge from a FSED occurred 86.2% (2106/2443) of the time in the standard care arm and increased to 95.1% (3052/3209) under the rapid protocol (aOr 1.48, 95% CI 1.03 – 2.13, p=.033). Initiation of a rapid rule-out protocol had no significant impact on overall ED length of stay (aOR 1.00, 95% CI 0.98-1.03, p = 0.8). There was a statistically significant reduction in FSED length of stay with application of a rapid rule-out protocol (3.43 hours (2.55, 4.58) vs. 3.97 hours (2.88, 4.77) using standard care, aOR 0.91, 95% CI 0.87-0.95, p <0.001). The percentage of patients who rule-out with their initial hs-cTnI (<4 ng/L) at FSEDs (74%) was significantly larger when compared to hospital based EDs (54%), p<.001. Safe discharge data for all 9 ED sites is detailed in table 1.

Conclusion: Implementation of a hs-cTnI rapid 0/1-hour protocol to evaluate for AMI in FSEDs is feasible and had greater impact on safe ED discharge and length of stay compared to HBEDs.

		Overall	Standard of Care	RACE-IT	% Difference	Adjusted OR	P-value
Freestanding ED	Site 1	910 / 1,046 (87.0%)	686 / 800 (85.8%)	224 / 246 (91.1%)	+5.3%	1.73 (1.07-2.93)	0.032
	Site 2	342 / 416 (82.2%)	311 / 380 (81.8%)	31 / 36 (86.1%)	+4.3%	1.49 (0.59-4.60)	0.437
	Site 3	3,085 / 3,326 (92.8%)	687 / 810 (84.8%)	2,398 / 2,516 (95.3%)	+10.5%	3.65 (2.76-4.82)	<0.001
	Site 4	821 / 864 (95.0%)	422 / 453 (93.2%)	399 / 411 (97.1%)	+3.9%	2.39 (1.09-5.07)	0.017
	Total	**5158 / 5652 (91.3%)**	**2106 / 2443 (86.2%)**	**3052 / 3209 (95.1%)**	**+8.9%**	**1.48 (1.03-2.13)**	**0.033**
Hospital Based ED	Site 5	3,806 / 5,809 (62.1%)	2,533 / 3,937 (64.3%)	1,073 / 1,872 (57.3%)	-7.0%	0.71 (0.63-0.80)	<0.001
	Site 6	3,114 / 5,789 (53.8%)	384 / 704 (54.5%)	2,730 / 5,085 (53.7%)	-0.8%	0.99 (0.84-1.17)	0.901
	Site 7	2,778 / 6,718 (41.4%)	900 / 2,428 (37.1%)	1,878 / 4,290 (43.8%)	+6.7%	1.39 (1.24-1.55)	<0.001
	Site 8	1,822 / 4,176 (43.6%)	502 / 1,247 (40.3%)	1,320 / 2,929 (45.1%)	+4.8%	1.21 (1.05-1.39)	0.010
	Site 9	2,631 / 4,465 (58.9%)	1,628 / 2,746 (59.3%)	1,003 / 1,719 (58.3%)	-1.0%	0.95 (0.83-1.08)	0.401
	Total	**13951 / 26957 (51.8%)**	**5947 / 11062 (53.8%)**	**8005 / 15895 (50.4%)**	**-3.4%**	**1.04 (0.94 – 1.15)**	**0.500**
	All Sites	**19,109 / 32,609 (58.6%)**	**8,053 / 13,505 (59.6%)**	**11,056 / 19,104 (57.9%)**	**-1.3%**	**1.03 (0.94-1.13)**	**0.500**

Table 1: Comparison of safe ED chest pain discharge rates between standard care and RACE-IT arms in all 9 EDs.

Yes, authors have interests to disclose

Disclosure: Beckman Coulter Funded This Trial Scientific Study/Trial

Beckman Coulter Funded This Trial

50 Hospital Admission Rates and Mortality Among Emergency Department Patients With COVID-19 Discharged With Remote Patient Monitoring With or Without HO2ME (home oxygen) – A Value-Based Approach

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Introduction: The pandemic caused by the novel Coronavirus 2019 (COVID-19) overwhelmed health care systems with emergency department (ED) and hospital crowding. Our hospital system was able to discharge a subset of COVID-19 patients home with remote patient monitoring (RPM) and home oxygen (HO_2ME) if needed, which opened up beds for the more critical patients. The objective of this study was to review the all-cause 30-day mortality and admission rates for patients chosen for our program, and to additionally examine the financial impact.

Methods: This was a retrospective cohort study of ED patients who tested positive for COVID-19, and who were discharged home on RPM with or without HO_2ME. For the primary statistical analysis, descriptive statistics were calculated and reported as medians with interquartile ranges. For the purpose of financial analysis, we filtered a subset of insured patients who were sent home with oxygen.

Results: 490 patients were enrolled with a median age of 62 years (interquartile range (IQR), 59-65 years), and median body mass index (BMI) of 31 (IQR 26-37). The most common co-existing conditions were obesity and hypertension (43%), followed by diabetes mellitus (23%). Of the 490 patients, 151 patients (31%) met requirements for home oxygen and were discharged with oxygen via nasal canula in addition to their RPM device. Over a median enrollment time of 15 days (IQR 10-22), patients discharged from the emergency department on the RPM program were observed to have an all-cause 30-day mortality rate of 3.2% (95% CI, 1.8%-5.2%). The observed rate of all-cause admission within 30 days was 17% (IQR 14-21). The financial analysis revealed that insurance companies saved and that was just a small subset of the enrolled patients.

Conclusions: This study demonstrated that rapidly deploying a RPM program for patients with acute COVID-19 infection allowed our health system to safely care for patients in their homes. The program opened hospital beds for more severe and critically ill COVID-19 patients who necessitated more intense monitoring and inpatient care, while simultaneously observing low 30-day all-cause mortality and admission rates.

No, authors do not have interests to disclose

51 Gender and Clinician Type: Who Is Leaving the Emergency Workforce?

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Background: Prior emergency workforce analyses have failed to present granular data stratified by gender despite reports of gender-based differences in burnout and non-clinical domestic responsibilities. We sought to identify trends between 2013 and 2019 in: 1) the workforce's proportional composition by gender and clinician type – emergency medicine (EM) physician, non-emergency physician and Advanced Practice Provider (APP), and 2) the amount of clinicians leaving the workforce by gender.

Methods: We performed a repeated cross-sectional analysis of emergency clinicians receiving reimbursement for at least 50 Evaluation & Management (E/M) services [99281-99285] from Medicare Part B. Stratified by gender and clinician type, we calculated the emergency workforce's annual attrition. Attrition captured clinicians leaving temporarily and permanently, respectively defined as clinicians not meeting the reimbursement threshold for E/M services in the immediate subsequent year or all subsequent years in the study performance time period.

Results: From 2013 to 2019, 50,456 male and 32,209 female clinicians performed at least 50 E/M services within one of the study years, including 47,108 emergency physicians, 9,047 non-emergency physicians, and 26,510 APPs. Among all clinicians, females made up an increasing proportion of the overall workforce (31.7% in 2013; 36.5% in 2019), as well as component part of the emergency physician workforce (25.2% in 2013; 28.3% in 2019), the non-emergency physician workforce (16.9% in 2013; 19.3% in 2019), and the APP workforce (60.7% in 2013; 62.5% in 2019). Of all female clinicians, APPs made up an increasing proportion of the workforce, rising from 39.9% in 2013 to 44.6% in 2019. Of all male clinicians, APPs made up an increasing proportion of the workforce, rising from 12.0% in 2013 to 15.4% in 2019. The number of male clinicians leaving the workforce increased from 2,736 in 2013 to 2,931 in 2019 (a 7.1% increase), while the number of female clinicians leaving the workforce increased from 1,856 in 2013 to 2,711 in 2019 (a 46.1% increase). Among female clinicians, emergency physicians comprised 24.1% of clinicians leaving the workforce in 2013 and 20.1% in 2019, while APPs comprised 66.9% of clinicians leaving the workforce in 2013 and 73.6% in 2019.

Conclusion: Female clinicians comprised approximately one-third of the emergency clinician workforce by 2019, with the increase from 2013 driven by a greater number of female APPs. Three-quarters of the male clinicians in the workforce were emergency physicians, while approximately one-half of the female clinicians in the workforce were emergency physicians. Over recent years, a substantially greater proportion of female clinicians left the emergency workforce compared to their male counterparts.

No, authors do not have interests to disclose

52 Methodology for Measuring Health-Related Quality of Life Impact of Disasters

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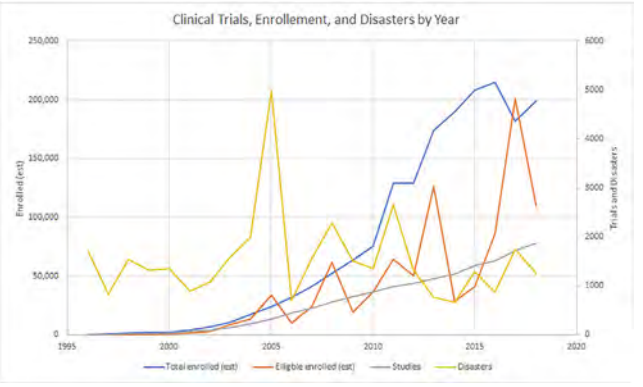
Background: Any disaster has significant and far-reaching impacts on a population, but a measure of the health impacts a disaster has on a population is still difficult to obtain. A quantitative understanding of the expected impact of a disaster on a community's various health problems and a population's health status will need to be examined before and after a disaster, with reliable, consistent data collection. This is challenging as disasters generally cannot be predicted. We have devised a novel method by which a population's health can be examined with reasonable reliability both before and after a tragedy occurs using data gathering methods already in place at the time of a disaster.

Methods: The Federal Emergency Management Agency (FEMA) database of declared disasters from 1996 through 2018 was cross-referenced against the ClinicalTrials.gov database. Clinical trials that tracked health-related quality of life (QoL) measures, such as the Health-Related Qol, Short-Form 36, EuroQol, or the WHOQol, were selected. Studies that performed serial QoL measurements before and after a FEMA declared disaster and recruited patients in a county where FEMA declared a disaster were collated. An assumption of smooth enrollment was made across multiple enrollment sites and multiple years.

Results: Between 1996 and 2018, FEMA declared 35,270 disasters (median of 1,344 per year, IQR 989 - 1,653). Severe storms were 40%, hurricanes 28%, floods 9%, fires 8%, and snow 6%. ClinicalTrials registered 15,203 studies with serial QoL measurements (median of 537 per year, IQR 80 - 1,095) in the same period. This represents a total estimated enrollment of 1,759,877 patients (median of 41,355 per year, IQR 5,149 - 151,429). When these two databases were collated together, an estimated 920,451 patients had serial QoL measurements both before and after a disaster and likely resided in a county of disaster (median 25,964 per year, IQR 4,228 - 58,788).

Conclusion: Registered clinical trials represent a vast untapped resource to assess the impact of disasters on health-related quality of life. Depending on the data recorded, chronic health conditions, social determinants of health, and other factors can be gleaned from these assembled data. Significant work would be required to coordinate sharing of this information. Collaboration on a policy level would help facilitate this.



No, authors do not have interests to disclose

53 Multicenter Test of the Emergency Department Trigger Tool: Site Differences in Adverse Events Detected

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Study Objectives: We have previously described the adverse events (AEs) detected using the Emergency Department Trigger Tool (EDTT). In this interim analysis of data from an ongoing international, multicenter study, we present types of ED AEs detected focusing on similarities and differences across sites in part demonstrating generalizability of this approach.

Study Design/Methods: This is a multicenter, retrospective study at 3 urban academic EDs. All patients >18 years completing an ED visit were eligible. We ran the EDTT query on electronic record data for ED visits between 06/2018 – 12/2020, sampling triggered records for dual independent nurse review and confirmatory physician review for AEs. Events were categorized by severity, omission/commission, and by a taxonomy with Categories, Subcategories and cross-cutting modifiers. We present events occurring in the ED and exclude those present on arrival. We present descriptive data with inter-site comparisons and compare results to those from our prior single center study.

Results: To date, we have identified 635 ED AEs in 499 of 2,134 records reviewed (23%). The majority were acts of commission (86% to 94%, no significant variation across sites, p=0.16). The severity distribution by site was: Temporary harm (45 to 51%); harm requiring admission or higher level care (13 - 24%); permanent harm (1 – 4%); harm requiring urgent intervention (12 – 37%); death (1 – 7%). Severity was higher than in the single center study (where, eg, 80% of events reflected temporary harm). This may be due in part to the stricter sampling scheme. The general pattern of event types was comparable across sites: Medication events were the most common, followed by Patient Care events (together accounting for 70-80% of all events); and Device-related and Surgical/Procedural events. Health care associated infections and care coordination events were rare at all sites (typically < 1%). A similar pattern was found in the single center study, though medication events were more predominant (65% vs. 33% to 54% in this study). As in the previous study, hypotension was the most common cross-cutting theme (22% to 44%, Table 1). Several site differences

were identified. One site had lower rates of AEs related to propofol and hypotension, but significantly higher rates of delay related AEs. Another site was characterized by higher rates of failure to monitor, procedural, pulmonary and transfusion related events; and the third by higher rates of vascular, infiltration/extravasation, iv contrast and acute kidney injury.

Conclusion: In this interim analysis of our multicenter study of the ED Trigger Tool, overall yield remained high (23% records with AEs). Severity of AEs detected was higher, with notably more cases detected that required urgent intervention, admissions or upgrades in care. This may in part be due to a trigger-rich selection of records at the outset of the study. It is possible that site differences will attenuate or emerge as data collection progresses. This interim analysis of data reflects that the EDTT is performing well across sites with generally consistent results and expected site variability. The identified site differences in cross-cutting themes could be used to identify local targets for quality improvement. Our results also underscore the need for tools such as the EDTT that can identify relatively large numbers of records with AEs to properly describe such differences.

Table 1. Frequencies of cross-cutting themes by site and compared to prior single site study.

	Previous	Site A	Site B	Site C	Site
	N=426	*N=168*	*N=170*	*N=161*	differences
Hypotension	26.1%	30.4%	43.5%	22.4%	***
Opioids	22.3%	13.1%	22.4%	11.8%	
Vascular	15.5%	17.9%	7.1%	5.6%	***
Infiltration/extravasation	14.1%	10.1%	2.4%	1.9%	***
Allergic reaction	12.4%	3.0%	3.5%	9.3%	
Hypoxia	12.2%	13.1%	17.1%	7.5%	
Propofol	12.0%	16.1%	23.5%	3.1%	***
Other	10.8%	19.6%	15.3%	11.8%	
Glycemic event	7.0%	5.4%	7.1%	0.6%	
Failure to monitor	6.6%	4.8%	12.4%	3.1%	***
Procedural	6.3%	6.5%	18.2%	4.3%	***
Intubation/ airway	6.1%	11.3%	15.3%	11.2%	
Delayed diagnosis/ treatment	5.9%	16.1%	10.0%	32.3%	***
Bleeding	5.2%	8.9%	8.8%	6.2%	
Cardiac	3.1%	5.4%	20.0%	16.8%	***
Neurological	2.8%	3.6%	7.1%	5.6%	
IV contrast	2.1%	8.3%	0.6%	2.5%	***
Gastrointestinal	1.6%	1.8%	4.1%	8.7%	
Acute kidney injury	1.4%	7.1%	0.6%	1.9%	***
Pulmonary	1.2%	5.4%	21.2%	9.9%	***
Transfusion	1.2%	3.0%	12.4%	1.9%	***
Renal	0.0%	2.4%	2.4%	6.2%	

Cross-cutting theme frequencies by site (% of AEs at that site that mention it). Only items found in >5% of AEs at at least one site are displayed. The corresponding frequencies for the previous single site study are given for reference ("Previous" column). Highlighted within column: The 5 most common within site. Themes whose frequencies vary significantly between sites (after correction for multiple comparison) are starred.

No, authors do not have interests to disclose

54 Discordance Between Pulmonary Embolism Risk Stratification and Elevated Lactate

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Study Objectives: Identifying pulmonary embolism (PE) patients who are at high risk for mortality or decompensation is the goal of risk stratification in PE. While not commonly included in current risk stratification schemes, elevated lactate levels may be an early marker of hemodynamic collapse. Prior studies have shown elevated lactate is associated with adverse outcomes in PE, including 2.5x higher 30-day all-cause mortality. To further characterize the relationship between elevated lactate and PE risk stratification, this study evaluated the prevalence of elevated lactate by PE risk level in patients undergoing mechanical thrombectomy in the FlowTriever All-Comer Registry for Patient Safety and Hemodynamics (FLASH) and assessed acute hemodynamic improvements and safety outcomes through 30 days.

Methods: FLASH is a prospective, multi-center registry designed to evaluate the safety and effectiveness of the FlowTriever System (Inari Medical) for mechanical thrombectomy in PE. Patients were risk-stratified using the ESC guidelines and Bova score and were also grouped by their pre-thrombectomy lactate values into normal (<2 mmol/L) or elevated (≥2 mmol/L) lactate groups. Within the elevated lactate group, a subgroup with very elevated lactate was defined (≥3 mmol/L). Pre- vs. post-thrombectomy changes in mean PA pressure (mPAP) and cardiac index (CI) were assessed within each lactate group. Safety outcomes through 30-day follow-up were recorded.

Results: A total of 186 patients had lactate data available pre-thrombectomy, of which 110 (59%) had normal lactate and 76 (41%) had elevated lactate. Of those with elevated lactate, 35 (46%) had very elevated lactate. There were no significant differences in age, sex, or BMI between normal and elevated lactate groups. In contrast, baseline RV/LV ratio was significantly higher in those with elevated lactate (1.47±0.5 vs. 1.63±0.5; p=0.025), as was the proportion of patients with elevated biomarkers (troponin and/or BNP; 91% vs. 99%; p=0.049). There was notable discordance between risk classifications and lactate status. For both ESC and Bova risk stratification schemes, elevated lactate was present in approximately one-third of patients who were not in the highest risk tier: 36% (60/167) with ESC intermediate-risk and 30% (29/98) with Bova scores in Stage I or II (Figure). Conversely, among all patients with elevated lactate, only 21% (16/76) were ESC high-risk and 50% (29/58) had Bova scores in Stage III (Table). Significant mPAP improvement was seen on-table after thrombectomy in all lactate groups (Table). Mortality and major adverse events (MAEs) were generally infrequent regardless of lactate status. No deaths occurred in patients with very elevated lactate through 30 days.

Conclusion: Despite their classification into lower-risk tiers using PE risk stratification, 36% of ESC intermediate-risk patients and 30% of Bova Stage I or II patients had elevated lactate, suggesting these patients who appear stable may be at higher risk for mortality or deterioration. Mechanical thrombectomy with FlowTriever resulted in significant improvements in mPAP regardless of lactate status. In contrast to prior studies, low rates of 30-day mortality were seen in PE patients with elevated lactate, with none occurring in those with very elevated lactate.

Figure. Prevalence of Elevated Lactate in ESC Intermediate-risk and Bova Stage I/II Risk Tiers

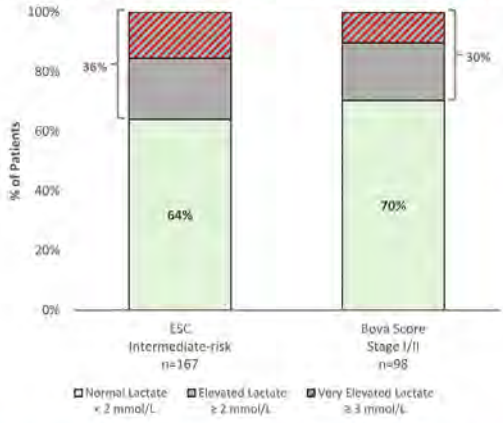

Table. Risk Stratification, Safety Outcomes, and Acute Hemodynamics by Lactate Groups

	Lactate Groups				Subgroup	
	Normal < 2 mmol/L n=110		Elevated ≥ 2 mmol/L n=76		Very Elevated ≥ 3 mmol/L n=35	
RISK STRATIFICATION						
ESC Classification						
High risk	3/110 (2.7%)		16/76 (21.1%)		9/35 (25.7%)	
Intermediate risk	107/110 (97.3%)		60/76 (78.9%)		26/35 (74.3%)	
Bova Score						
Stage III (Score 5+)	29/98 (29.6%)		29/58 (50.0%)		15/25 (60.0%)	
Stage I or II (Score 0-4)	69/98 (70.4%)		29/58 (50.0%)		10/25 (40.0%)	
SAFETY OUTCOMES						
48h MAE	0/110 (0%)		3/76 (3.9%)		2/35 (5.7%)	
All-Cause Mortality						
48h	1/110 (0.9%)		0/76 (0%)		0/35 (0%)	
30d	2/101 (2.0%)		1/70 (1.4%)		0/30 (0%)	
ACUTE HEMODYNAMICS						
	Pre	Post	Pre	Post	Pre	Post
mPAP, mmHg	31.0 ± 8.3	24.1 ± 8.4†	33.5 ± 9.6	25.8 ± 9.2†	34.7 ± 9.6	26.7 ± 9.9†
CI, l/min/m²	2.58 ± 0.8	2.61 ± 0.8	2.47 ± 0.9	2.54 ± 0.8	2.22 ± 0.8	2.46 ± 0.9†

†Significantly ($p < 0.05$) improved compared to pre-thrombectomy based on paired assessments.

Yes, authors have interests to disclose
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Consultant/Advisor
RapidAI

Disclosure: Inari Medical
Consultant/Advisor
Inari Medical

55 Andexanet Alfa Is Associated With Reduced In-hospital Mortality Compared to 4-Factor Prothrombin Complex Concentrate Among Patients With Intracranial or Gastrointestinal Bleeding

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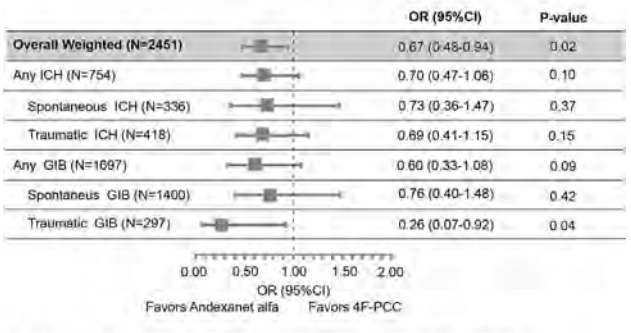
Study Objectives: There are limited data on real-world effectiveness of the specific factor Xa (FXa) inhibitor reversal agent andexanet alfa (AA) in comparison with 4-factor prothrombin complex concentrates (4F-PCC). We compared in-hospital mortality in patients hospitalized with oral FXa inhibitor- or enoxaparin- related intracranial hemorrhage (ICH) or gastrointestinal (GI) bleeds who were treated with AA or 4F-PCC.

Methods: This multicenter retrospective cohort study used patient chart data collected from 182 US hospitals of varying type (academic, non-academic, designated trauma and/or stroke center) and size between May 17, 2018 and September 30, 2021. Included patients were aged ≥18 years, had an International Classification of Diseases-10th Revision (ICD-10) diagnosis code of D68.32 (bleeding due to extrinsic anticoagulants) as part of inpatient admission, a record of FXa inhibitor or enoxaparin use, were treated with AA or 4F-PCC during index hospitalization, and had a documented discharge disposition. Propensity scores were estimated using logistic regression, with multiple imputations for missing values, to create inverse probabilities of treatment weights to balance the two treatment groups. All available baseline variables including age, sex, comorbidities, systolic blood pressure, international normalized ratio, and albumin were included in the propensity score models. The primary outcome was in-hospital mortality. For each bleed type (ICH; GI), odds ratios (OR) across bleed cause (spontaneous; traumatic) were determined by estimating the weights within strata defined by bleed cause.

Results: This study included data from 2,451 patients (AA, n=1,196; 4F-PCC, n=1,255) and 179 deaths. There were 754 patients with ICH (spontaneous, n=336; traumatic, n=418) and 1,697 patients with a GI bleed (spontaneous, n=1,400; traumatic, n=297). Among ICH patients, in-hospital mortality incidence ranged from 10%-17% for AA and 14%-24% for 4F-PCC, depending on the bleed cause. For GI bleed, in-hospital mortality incidence ranged from 2.0%-2.5% for AA and 3.3%-7.5% for 4F-PCC, depending on the bleed cause. In the overall weighted analysis, the odds for in-hospital mortality were lower for AA versus 4F-PCC (OR: 0.67 [95% CI: 0.48-0.94]) (Figure). The ORs were consistent across bleed type and cause, suggesting AA was associated with reduced in-hospital mortality compared to 4F-PCC (ORs ranging from 0.26 and 0.76).

Conclusion: In this large retrospective study, treatment of oral FXa inhibitor- or enoxaparin-related ICH and GI bleeding hospitalizations with AA was associated with a 33% reduction in odds of in-hospital mortality compared to 4F-PCC. Effectiveness of AA versus 4F-PCC was consistent across ICH and GI bleeds.

Figure. Odds ratios of in-hospital mortality for AA vs 4F-PCC in weighted analyses



AA, andexanet alfa; 4F-PCC, 4-factor prothrombin complex concentrate; OR, odds ratio; CI, confidence interval; ICH, intracranial hemorrhage; GIB, gastrointestinal bleed.
Odds ratios < 1.0 indicate that treatment with AA was associated with a lower odds of death.

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EMF 56 Augmenting D-dimer Testing for Pulmonary Embolism Rule-out in the Emergency Department With Artificial Intelligence

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Study Objectives: Pulmonary embolism (PE) is a common emergency department (ED) diagnosis with a greater than 4% mortality rate, resulting in frequent over-testing via computed tomography PE (CT-PE) and exposing patients to the harms of ionizing radiation, iodinated contrasts, and increased costs. Clinical decision rules incorporating D-dimer testing are used to identify patients whose PE risk is below a CT-PE imaging threshold, but are subject to high rates of false positives and inconsistent use. We hypothesized that an artificial intelligence (AI) algorithm would augment existing D-dimer-based risk stratification and identify patients who are unlikely to benefit from imaging.

Study Design: We performed an observational study of adult (≥ 18 years) ED visits for which a CT-PE was ordered between 2013 and 2021 at a large academic medical center. Visit ICD codes and direct natural language processing (NLP) interpretation of CT-PE reads were used to determine visit-level PE diagnosis. Visits for which there was disagreement between ICD codes and the NLP extraction of PE findings were reviewed by a member of the study team to establish the diagnosis of PE. We then trained an AI gradient boosting model to predict the presence or absence of PE based on EHR data available prior to the CT-PE order including chief complaint, vital signs, past medical history, medications, and laboratory studies. We investigated whether AI could identify patients with either no D-dimer or a positive age-adjusted D-dimer who had a < 2% likelihood of PE for whom imaging may have been avoided.

Results: A total of 7,934 visits met inclusion criteria with a PE diagnosis rate of 10.1%. The mean age of the cohort was 60.1 years, 64.1% were female, 26.7% Black, 15.5% Hispanic, 25.9% had a cancer history, and 9.2% had a history of PE. Patients with a positive age-adjusted D-dimer had a 10.4% rate of PE, while patients with no D-dimer had a 10.8% rate of PE. In a validation cohort consisting of 10% of the visits, the AI model had an area under receiver-operating characteristic curve of 0.75. Using an AI model risk cutoff of 1%, 157/293 (54%) of age adjusted D-Dimer positive patients were determined to be low risk for PE with a PE rate of 0.6% (95% CI: 0 – 1.9%) while 107/304 (26%) of patients with no D-dimer were identified as low risk with a PE rate of 4.7% (0.6 – 8.7%).

Conclusion: In patients with positive age-adjusted D-dimers, over half of patients were identified as low risk for PE using AI with a resultant PE rate of < 2%. In patients without D-dimer measurements, AI did not robustly identify a population below the 2% testing threshold. These data suggest that there may be a role for AI-augmented risk stratification with positive age-adjusted D-dimers. Moreover, at a time of limited intravenous contrast availability, employing this algorithm could decrease overall utilization by as much as 17%.

No, authors do not have interests to disclose

57 Buprenorphine Initiation for Pregnant Patients With Opioid Use Disorder: A Multicenter Observational Study of California Bridge Sites

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Study objective: Opioid use disorder (OUD) diagnoses and overdose rates are increasing among pregnant women in parallel with the general population. Emergency departments (EDs) have emerged as critical sites for the initiation of treatment for OUD, but outcomes of ED initiated buprenorphine and linkage to care for pregnant women have not been described. Robust outpatient literature supports the safety of buprenorphine in pregnancy. However, no ED studies exist to support ED initiation of buprenorphine in pregnant patients. We aim to describe any differences in characteristics, treatment dosing, outcomes, and rates of linkage to care for pregnant women compared to non-pregnant women with OUD presenting to EDs funded by the California (CA) Bridge Program.

Methods: The CA Bridge model included low-threshold buprenorphine, linkage to care, and harm reduction technical support to EDs to improve treatment for OUD. This retrospective cohort study described pregnant and non-pregnant women of childbearing age with OUD who presented to 17 EDs between January and April of 2020. Primary outcome was linkage to substance use treatment within 14 days of ED discharge; secondary outcomes included descriptive characteristics, buprenorphine dosing, side effects, and complications.

Results: Of 250 women of childbearing age who presented to 17 EDs, 22 (6%) were pregnant. The median age of pregnant cohort was 29 (interquartile range [IQR]: 26-32) and 31 (IQR: 27-36) in non-pregnant cohort. 57% of each cohort were white. 29% in each cohort were unhoused. Among pregnant women 16 (76%) used heroin, and 4 (19%) used fentanyl; among non-pregnant women, 170 (74%) used heroin, and 24 (11%) used fentanyl. 38% of each cohort used intravenous drugs. A majority of pregnant (67%) and non-pregnant (89%) patients presented in opioid withdrawal or were seeking OUD treatment. A majority of pregnant and non- pregnant women accepted OUD resources (81% and 77%, respectively), and ED buprenorphine administration (67% and 59%, respectively). Among 14 pregnant women and 136 non-pregnant women who received sublingual buprenorphine, 71% and 89% (respectively) received an initial dose of 8mg or higher; 79% and 91% (respectively) received a total dose of 8mg or higher. Of the 250 patients, there was 1 case of precipitated opioid withdrawal, which occurred in a non-pregnant patient. 38% of pregnant women and 59% of non-pregnant women had buprenorphine prescribed at ED discharge. Within 2 weeks of discharge, 48% of pregnant women and 31% of non-pregnant women attended follow-up, and 48% of pregnant women and 34% of non-pregnant women confirmed still taking buprenorphine.

Conclusion: Pregnant women with OUD who presented to EDs treated with CA Bridge protocols had similar characteristics, acceptance of treatment, dosing, treatment outcomes, and follow up rates as non-pregnant women. This data indicates that EDs can serve an important role for initiating buprenorphine for pregnant women.

No, authors do not have interests to disclose

58 The Impact of Cognitive Impairment and Mood Disorders on Quality of Life in Out-of-Hospital Cardiac Arrest Survivors

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Objectives: Although not a few survivors from out-of-hospital cardiac arrest discharged with good neurological prognosis, they commonly experienced cognitive dysfunction, and mood disorders, and recent guidelines emphasized the need for early evaluation of these disorders and appropriate interventions. The objective of this study was to examine the prevalence and risk factors of cognitive and mood disorders in patients discharged with a favorable neurologic outcome among survivors after out-of-hospital cardiac arrest.

Methods: We conducted a single center, retrospective cross-sectional study from a prospectively enrolled registry of nontraumatic adult out-of-hospital cardiac arrest survivors treated with targeted temperature management from July 2012 to June 2021. Among them, non-face-to-face evaluation was conducted by telephone for patients with the Cerebral Performance Category 1 or 2 after six months of discharge. Cognitive functions were evaluated using telephone Montreal Cognitive Assessment and Alzheimer's Disease-8, and mood disorders were assessed by Patient Health Questionnaire-9 and Hospital Anxiety and Depression Scale. Quality of life was measured by using the EuroQol Five Dimensions Five Levels questionnaire and the EuroQol Visual Analogue Scale. Multivariable logistic analysis was performed to determine the independent risk factors of cognitive and mood disorders.

Results: A total of 364 non-traumatic adult out-of-hospital cardiac arrest patients, of which 107 patients (39.4%) showed good neurologic outcomes at the time of discharge. Of the 97 patients who were finally interviewed by telephone, 23 patients (23.7%) were confirmed to have cognitive impairment and 28 patients (28.9%) were confirmed to have mood disorders. Multivariable logistic regression analyses showed that age (adjusted odds ratio 1.06 [1.01 – 1.10]; $p = 0.013$), cardiac arrest of cardiac origin (adjusted odds ratio 0.14 [0.04 – 0.55]; $p = 0.005$) and initial asystole rhythm (adjusted odds ratio 15.33 [1.41 – 166.21]; $p = 0.025$) were independently associated with cognitive impairment. Mood disorders were associated with cardiac arrest of cardiac origin (adjusted odds ratio 0.10 [0.03 – 0.32]; $p < 0.001$), but not with age and initial rhythm. Although the quality of life was evaluated to be significantly low in the group with cognitive impairment, mood disorders did not affect the quality of life.

Conclusions: Our results showed that not a few patients with a favorable neurological outcome experienced cognitive or mood disorders. Cardiac arrest of non-cardiac origin was independently associated with the occurrence of cognitive or mood disorders. Appropriate screening and active intervention of cognitive impairment, anxiety, and depression for these population would be necessary.

Yes, authors have interests to disclose

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59 Emergency Medical Technicians Can Administer Nitrous Oxide for Effective Analgesia in an Urban Multi-Tiered EMS System.

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Study Objective: The administration of inhaled nitrous oxide is not in the national scope of practice for emergency medical technicians (EMTs). While the safety and efficacy of inhaled nitrous oxide has been studied extensively, no study has examined its efficacy when administered by EMTs in the out-of-hospital environment. This study investigated the ability of inhaled nitrous oxide under EMT supervision to relieve pain while identifying demographic and clinical characteristics associated with patient improvement following out-of-hospital analgesics.

Methods: All EMTs employed by a municipal, multi-tiered emergency medical services (EMS) system serving a population of over 512,000 residents and responding to 90,000 calls a year participated in a pilot study approved by the state EMS office. This study was conducted over 365 days with IRB approval. EMTs were trained to administer nitrous oxide in accordance with a pre-approved standing order. Included patients were (1) 9-95 years of age with pain requiring analgesia and (2) first treated by a basic life support ambulance (no paramedic supervision). Included patients were offered a self-administering delivery system with 50% nitrous oxide and 50% oxygen. Pain intensity was measured immediately before inhalation, five minutes into self-dosing, and at emergency department (ED) triage using the 10-point Numeric Pain Rating Scale (NPRS). Patient response was further categorized by each EMT (improved, worsened or unchanged). Paired t-tests were used to assess the statistical significance of differences in NPRS secondary to inhalation. The t-tests were further stratified by pain type (traumatic and non-traumatic). Multivariate logistic regression

was used to assess the association between demographic and clinical characteristics and patient improvement following all treatments.

Results: Of the 176 patients (61.9% female), 125 (71.0%) demonstrated an improved response to nitrous oxide inhalation. The majority (81.3%) had traumatic pain. For all patients, NPRS decreased 2.26 ($p < 0.01$) five minutes into self-dosing and 2.31 ($p < 0.01$) at ED triage. Patients with traumatic pain experienced greater reductions in NPRS compared to those with non-traumatic pain, both five minutes into self-dosing (2.43, $p < 0.01$ vs. 1.52, $p < 0.01$) and at ED triage (2.41, $p < 0.01$ vs. 1.95, $p = 0.01$). Eleven patients (6.3%) required additional analgesia from a paramedic. Paramedic treatments involved removal of a paramedic from emergency service and invasive procedures. These eleven patients had 87.6% lower odds of improving with any treatment (aOR=0.12, 95% CI=0.03-0.47, $p < 0.01$). For every 1-hour increase in pain duration, the odds of improving with any treatment decreased by 1.5% (aOR=0.99, 95% CI=0.98-1.00, $p = 0.04$). One patient reported an increased NPRS at ED triage; however, zero patients demonstrated a worsened (compared to unchanged or improved) response to inhalation, and zero adverse events occurred.

Conclusion: Nitrous oxide inhalation, when supervised by trained EMTs, significantly reduces NPRS of out-of-hospital patients. Patients who present to EMTs with pain that cannot be relieved by inhalation may also fail to achieve pain relief from parenteral medications. Local agencies, along with state bodies and national officials, should pursue further research into out-of-hospital analgesia options for EMTs and might consider expanding the EMT scope of practice to include self-administration of nitrous oxide.

No, authors do not have interests to disclose

60 Temporal Trends in the Use of Computed Tomographic Pulmonary Angiography for Suspected Pulmonary Embolism in the Emergency Department

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Background: In recent years, several clinical decision rules, including age-adjusted D-dimer threshold, PERC, YEARS, and PEGeD, have been derived to safely limit the use of computed tomographic pulmonary angiography (CTPA) in patients with suspected pulmonary embolism (PE) in the emergency department (ED). The hypothesis of this study is that this has led to a subsequent reduction in CTPA use.

Objectives: To evaluate the temporal trend of CTPA use for suspected PE between 2015 and 2020. Method: This was a retrospective multicenter time series analysis of 26 European EDs in 6 countries. All CTPA performed for suspected PE in the ED during the first 7 days of each odd month between January 2015 and December 2019 inclusive were included (ie a total of 30 7-day periods). The primary endpoint was the number of CTPA performed in each period per 100 000 ED visits/year. Secondary endpoints included the diagnosis of PE, the size of PE diagnosed, in- or out-patient management of PE, and CTPA yield. The endpoints were analyzed using linear regression and confirmed with mixed generalized linear models (MGLM) and Seasonal Autoregressive Integrated Moving Average (SARIMA) models.

Results: 8707 CTPA were included (median age 64 [47; 76] years, 56% female). According to the revised Geneva score, the clinical probability of PE was low for 2225 (26%) patients, intermediate for 5808 (67%) patients, and high for 674 (8%) patients. Overall, a mean of 11 CTPA were performed each week during the study period, and 1413 (16.4%) patients had a PE. The mean number of CTPA per week increased from 9 in 2015 to 12 in 2019. The number of CTPA per 100,000 visits/year increased with a statistically significant annual increase of 41 (95% CI 11 to 70, p=0.01) (Figure 1). Both the MGLM and SARIMA techniques confirmed the significant trend, with annual increases of 41 (95% CI 18 to 64, p=0.001) and 54 (95% CI 91 to 178, p=0.01) CTPA per 100,000 visits/year for the MGLM and SARIMA models respectively. During the study period, there was also an increased number of PE diagnosed per 100,000 visits/year (138 in 2015 and 163 in 2019, significant annual increase 7 [95% CI 1 to 13], p=0.033). The CTPA positive rate remained stable over time (17%). The number of PE that were treated with outpatient management increased from 18 in 2015 to 28 in 2019 (significant annual increase 2 [95% CI 0 to 3], p=0.004). All significant trends were confirmed through further analyses, using MGLM and SARIMA models. Of note, the SARIMA model showed a seasonality in CTPA use, with greater usage during winter.

Conclusion: In this retrospective study of 26 European EDs, the number of CTPA performed for suspected PE has significantly increased between 2015 and 2020, with a concurrent increase in the number of PEs diagnosed, and a stable diagnostic yield.

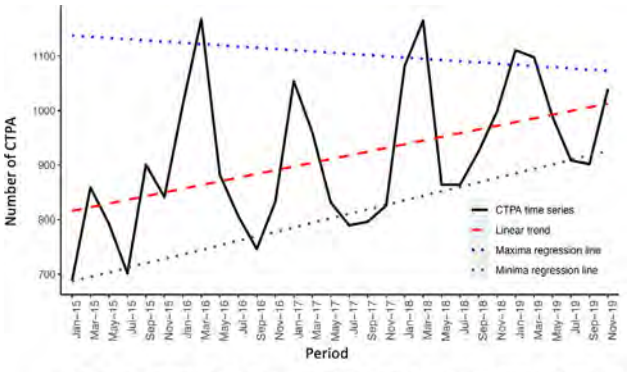

Figure 1. Temporal evolution of the number of CTPA performed each 7-day period, per 100,000 visits/7-day period in patients with suspected pulmonary embolism in the emergency department.
CTPA: Computed tomographic pulmonary angiography

No, authors do not have interests to disclose

61 Designing and Developing A Digital Equity Dashboard For the Emergency Department

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Study Objectives: Nationally, disparities in diagnosis, treatment, and health outcomes of racial minorities are well documented in the emergency department (ED). While EDs may conduct regular quality and process improvement initiatives, it is rare to provide daily mechanisms for administrators, clinical staff, and trainees to examine clinical data stratified by demographic details (ie race, ethnicity, age, language, sex). A web-based solution would provide an up-to-date summary of patient care, and allow users to identify opportunities for improvement. The objective of our study was to inform the development of an "Equity Dashboard" to meet this need in an ED at a large, academic, safety-net, level one trauma center.

Study Design/Methods: We utilized a design-thinking approach to develop a digital platform incorporating real-time data from our ED electronic medical records (EMR) to highlight demographic, clinical, and operational variables in the "Equity Dashboard". The Dashboard's dynamic, visually informative interface allows users both to appreciate a snapshot of all ED patients and to further investigate details of interest. Users are able to explore ED time course and care decisions by demographic group, clinical acuity and diagnosis. To measure impact, we conducted a survey of end-users using custom questions, as well as the System Usability Scale (SUS) and Net Promoter Score (NPS), both of which are validated health technology utilization instruments.

Results/Findings: Our final product, the Equity Dashboard, is an interactive platform that enables clinicians to explore trends in patient care. We surveyed 32 residents and attendings practicing in our ED to obtain initial feedback on the tool in the two weeks following its launch. The results reflected overall ease of usability (SUS 73.5, 95% CI 67.9-79.1), with respondents reporting they are likely to recommend the dashboard to colleagues (NPS 27). 77% of surveyed clinicians agreed that they plan to change parts of their practice based on what they learned from the Equity Dashboard. Noted areas for improvement included further exploration of the limitations of EMR data, and building additional options for demographic breakdown, particularly within pediatrics.

Conclusion: The Equity Dashboard facilitates data access and visualization of clinical and demographic trends in the ED. This digital tool is of particular use for quality improvement initiatives, as it reflects common departmental challenges including delays in orders, inpatient boarding, and throughput metrics. Importantly, the Equity Dashboard helps demonstrate how these operational factors differentially impact our diverse patient population. This platform enables the ED team to measure

current performance, to identify our vulnerabilities, and to design targeted interventions to address disparities in clinical care.

Yes, authors have interests to disclose
Disclosure: Fujifilm-SonoSite
Consultant/Advisor
Fujifilm-SonoSite

EMF 62 Metagenomic Analysis of the Urinary Microbiome Among Older Adult Emergency Department Patients With Suspected Urinary Tract Infection

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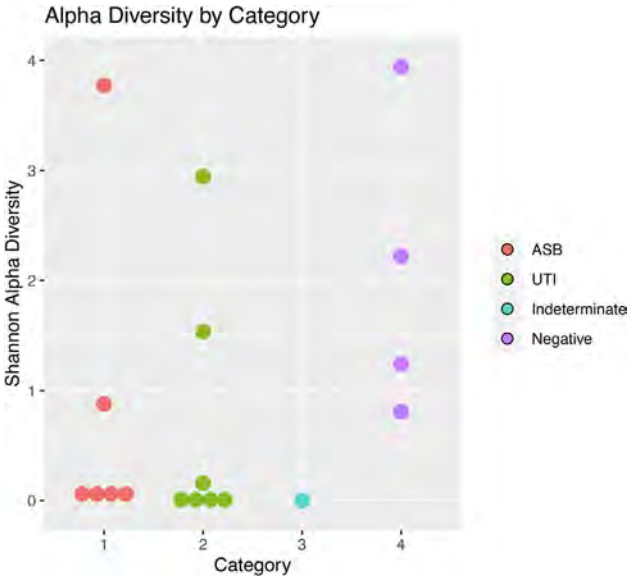
Study Objectives: Guidelines from numerous societies state that urinalysis for suspected Urinary Tract Infection (UTI) should only be ordered on older adults (age > 65) in the presence of signs and symptoms of a UTI. This is due to a high rate of asymptomatic bacteriuria (ASB) in this population, a condition in which urinalysis may appear positive and urine culture may grow a urinary pathogen, but there is no benefit to treatment with antibiotics. However, urinalysis is commonly performed on older adults presenting to the emergency department (ED) for vague symptoms such as generalized weakness or altered mental status, despite these not being signs or symptoms of UTI. We sought to determine if there was a measurable difference in the bacterial populations in the urine, also known as the urinary microbiome, among older adult patients ED based on signs and symptoms of UTI and results of urinalysis.

Methods: We conducted a prospective cohort study of a convenience sample of older adults that had urinalysis for suspected UTI performed within the ED. History of treatment for UTI, prior GU procedures (catheterization ect), and current urinary symptoms by patient interview. Medical history, signs of UTI (fever, flank tenderness, ect), urine culture results, and results of ED testing were collected from the Electronic Medical Record. Results of urinalysis were considered consistent with ASB or UTI if there was the presence of pyuria or positive nitrates. Patients were categorized as likely UTI if they had signs and symptoms of UTI based currently accepted guidelines and a positive urinalysis, likely ASB if urinalysis appeared positive but the patient did not have clear signs and symptoms of UTI (eg only generalized weakness), indeterminate, or negative if the urinalysis was not positive and the patient's symptoms had a clear alternative diagnosis. The same urine sample that had automated urinalysis and culture performed were then obtained from the clinical lab, microbial DNA was extracted and analyzed by high-throughput DNA sequencing. Microbial populations were analyzed from sequencing results using available microbiome analysis software packages (metaphlan, Qiime2)

Results: Of the first 18 enrolled patients, 6 were diagnosed as likely UTI, 7 as likely ASB, 4 with negative testing, and 1 indeterminate. Those with negative urinalysis showed higher microbial diversity than those with likely UTI or ASB (mean Shannon alpha diversity 2.05, 0.66, and 0.8 respectively). Patients whose cultures grew urinary pathogens were significantly dissimilar from those who did not (PERMANOVA on Bray-Curtis distance p =0.04).

Conclusion: The urinary microbiome of patients with both UTI and ASB tended to show lower diversity with increased representation of urinary pathogens. Of note, in our indeterminate case, the patient had symptoms of UTI and a positive urine culture, but a UA that did not show pyuria or nitrates, microbiome analysis showed low diversity with largely a single urinary pathogen represented, similar to our ASB and UTI categories. This suggests that molecular-based testing could be used for UTI diagnosis that may detect cases with negative urinalysis but may not reliably distinguish UTI and ASB. In future analysis, we will analyze microbial gene content to determine if the presence of certain microbial genes can distinguish between these two conditions which could be targeted for future diagnostics.



No, authors do not have interests to disclose

63 Neuronal Death-associated Proteins S100B, Tau and Neuron Specific Enolase Association to Sepsis-related Organ Dysfunction and Death in the Elderly: A Prospective Single Center Cohort Study

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Background: Sepsis is a highly prevalent condition in the emergency department (ED) with high mortality, ICU admission and tracheal intubation rates. Its physiopathology is not fully understood, and how neuronal death-related cell markers relate is partially unknown. Our aim was to assess whether these markers are positively associated with worse outcomes in elderly septic patients.

Methods: This is an observational prospective single-center cohort study with consecutive sampling. Elderly patients admitted to the ED at a large quartenary center in Latin America were assessed for enrollment. Inclusion criteria: age (older than 65 years), less than 24h of hospitalization and a sepsis diagnosis at any point during hospital stay. Exclusion criteria: brain damage - stroke or traumatic brain injury. Data was collected at baseline for demographics, clinical features and laboratory data. Sepsis-related clinical scores such as Systemic Inflammatory Response Syndrome (SIRS), National Early Warning Score (NEWS), Sequential Organ Failure Assessment (SOFA) and qSOFA were calculated. Neuronal death-

associated proteins - S100B, neuron specific enolase (NSE) and Tau - and inflammatory cytokines - TNF-α, IL-1B, IL-4 IL-10 and IFN-γ - were measured by ELISA. Main outcome was death during hospital stay, and secondary outcomes were ICU admission and tracheal intubation. Nominal and discrete variables were described for frequency, and mean, standard deviation and median were calculated for continuous variables. Shapiro-wilks test was used for normality, and Wilcoxon-test was used for non-normal data. An univariate analysis for each outcome was performed with a 95% confidence interval.

Results: Sixty-three elderly septic (male: 67%(n=41) patients were enrolled, median age of 73 years. Most frequent comorbidities were high blood pressure (60%), diabetes (40%), previous stroke (22%), dyslipidemia (19%) and chronic kidney disease (16%). Regarding main outcome, 23%(n=14) died, 35%(n=22) were transferred to the ICU and 19%(n=12) were intubated. In the univariate analysis, NSE, S100B and Tau proteins were not associated to death, ICU admission or tracheal intubation. Heart rate (p=0.02), platelet count (p=0.05), absolute SOFA score (p=0.00) and SOFA greater than 2 (p=0.04) were positively associated to death. For ICU admission, NEWS (p=0.01) and SIRS (p=0.04) had significant values, and no associations were made for tracheal intubation. In exploratory analysis, positive qSOFA patients had higher NSE (3.37 vs 2.18; p=0.02) and Tau protein (127.21 vs 79.29; p=0.04) values, but no difference was observed for S100B (0.16 vs 0.16; p=0.57), nor when comparing these values for SIRS (NSE: 2.62 vs 2.01; p=0.18 | Tau: 95.47 vs 69.05; p=0.17 | S100B: 0.16 vs 0.16; p=0.52), SOFA (NSE: 2.55 vs 1.82; p=0.29 | Tau: 91.94 vs 70.90; p=0.40 | S100B: 0.15 vs 0.16; p=0.56) and NEWS (NSE: 2.68 vs 2.18; p=0.15| Tau: 96.88 vs 79.29; p=0.22 | S100B: 0.16 vs 0.15 ; p=0.21). Exploratory analysis for cytokines (TNF-α, IL-1B, IL-4 IL-10 and IFN-γ) showed no difference between groups as well.

Discussion: Despite not finding association between neuronal death-related proteins to death and secondary outcomes, our findings suggest a positive association between Tau and NSE in elderly positive qSOFA patients. This is a previously not reported finding to our knowledge, and might be a first step for further research in sepsis physipopathology and better understanding on organ disfunction.

	qSOFA < 2			qSOFA ≥ 2			P value
	Median	Per 25	Per 75	Median	Per 25	Per 75	
S100B	0,16	0,12	0,19	0,16	0,16	0,17	0,58
NSE	2,18	1,52	2,79	3,37	3,30	4,02	0,02
Tau	79,29	53,37	99,55	127,21	112,12	134,43	0,05
IFN-γ	2,10	1,47	3,62	1,47	1,47	4,07	0,59
IL-10	9,17	3,66	20,61	4,27	3,65	36,54	0,98
IL-1β	0,86	0,77	1,38	0,91	0,89	0,94	0,95
IL-4	3,39	1,95	3,39	1,95	1,95	4,61	0,90
TNF-α	27,82	15,84	41,17	47,18	30,62	47,78	0,61
	SIRS < 2			SIRS ≥ 2			P value
	Median	Per 25	Per 75	Median	Per 25	Per 75	
S100B	0,16	0,13	0,19	0,16	0,13	0,18	0,52
NSE	2,01	1,44	2,82	2,62	1,76	3,06	0,18
Tau	69,05	53,03	98,35	95,47	64,71	107,46	0,17
IFN-γ	2,10	1,47	3,43	1,78	1,47	3,62	0,71
IL-10	11,56	3,65	16,62	6,12	3,66	35,82	0,84
IL-1β	0,86	0,77	0,96	0,96	0,84	1,43	0,08
IL-4	1,95	1,95	3,39	3,39	1,95	5,79	0,48
TNF-α	29,63	18,53	41,17	23,93	14,05	47,78	0,65
	SOFA < 2			SOFA ≥ 2			P value
	Median	Per 25	Per 75	Median	Per 25	Per 75	
S100B	0,16	0,14	0,19	0,15	0,13	0,19	0,56
NSE	1,83	1,44	2,70	2,55	1,65	3,08	0,29
Tau	70,90	53,03	99,81	91,94	58,85	99,86	0,40
IFN-γ	1,78	1,47	3,03	2,10	1,47	3,79	0,52
IL-10	11,56	3,04	26,80	8,66	4,44	20,33	0,76
IL-1β	0,86	0,77	1,05	0,89	0,78	1,43	0,39
IL-4	1,95	1,95	3,39	3,39	1,95	5,79	0,09
TNF-α	23,33	14,24	38,89	30,79	17,89	48,38	0,24
	NEWS < 5			NEWS ≥ 5			P value
	Median	Per 25	Per 75	Median	Per 25	Per 75	
S100B	0,15	0,12	0,19	0,17	0,15	0,19	0,21
Enlosa	2,18	1,34	2,89	2,68	1,84	3,24	0,15
Tau	79,29	46,36	99,88	96,88	69,05	99,29	0,22
IFN-γ	2,10	1,47	3,62	1,78	1,47	2,10	0,22
IL-10	11,56	3,92	16,83	4,94	2,85	38,58	0,78
IL-1β	0,86	0,77	1,33	0,86	0,77	1,14	0,85
IL-4	3,39	1,95	5,79	1,95	1,95	3,39	0,34
TNF-α	28,53	17,25	38,58	23,33	12,24	48,38	0,56

NSE: neuron specific enolase ; SOFA: sequential organ-failure assessment ; qSOFA: quick-SOFA; SIRS: systemic inflamatory response score ; NEWS: National Early Warning Score;

No, authors do not have interests to disclose

64 Impact of Substance Use Navigators on Addiction Treatment and Outcomes for Emergency Department Patients in an Integrated Public Health System

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Introduction: There is strong evidence to support emergency department (ED) initiated addiction treatment and continuation of treatment with a warm handoff to a partnered low-threshold ambulatory clinic. To complement this infrastructure many medical systems have chosen to employ dedicated substance use navigators (SUNs) to optimize program effectiveness.

Study Objective: We describe patient treatment and linkage outcomes of a mature ED-initiated substance use program vertically integrated with a low-threshold Bridge Clinic under two conditions: (1) when the ED team was operating without a SUN and (2) when a SUN initiated services at the bedside in the ED.

Methods: This was a retrospective cohort study of adult patients discharged from one of three EDs within an integrated public health system between September 1, 2021 through January 2022 with cocaine, methamphetamine, alcohol, and opioid use related diagnoses. The primary outcome was follow-up attendance for substance use treatment within 30 days of ED discharge among patients with and without SUN services in the ED. We used logistic regression and nearest neighbor propensity score matching without replacement to control for confounding effects.

Results: There were 1,328 patients in the overall cohort, 119 (9.0%) of whom had SUN services; 50.4% of the patients with SUN services and 15.9% of patients without SUN services attended follow-up within 30 days of ED discharge (difference in proportions 34.5%, 95% confidence interval [CI]: 25.3-43.8%). Patients who had SUN services had higher rates of medications administered for addiction treatment (39.5% vs. 16.8%, p<0.001) and higher rates of medications for addiction treatment prescribed at discharge (47.1% vs. 20.7%, p<0.001). SUN services were associated with higher odds of follow-up after ED discharge for patients with alcohol diagnoses (odds ratio [OR] 7.1; 95% CI: 3.4-14.7), opioid diagnoses (OR 2.5; 95% CI: 1.4-4.2), and cocaine diagnoses (OR 16.8; 95% CI: 2.2-125.3); but were not for patients with methamphetamine related diagnoses (OR 2.2; 95% CI: 0.5-10.7). In the multivariable model, SUN services were associated with higher odds of follow-up (aOR 3.7, 95% CI: 2.4-5.8). In the propensity score matched analysis, SUN services were associated with 5.3 higher odds of follow-up (95% CI: 2.9-9.8).

Conclusion: Receipt of substance use navigation services among ED patients with opioid, stimulant, and alcohol use disorders was strongly associated with improved quality of care and improved follow-up engagement in addiction treatment.

No, authors do not have interests to disclose

65 Missed Opportunities for Diagnosis of Human Immunodeficiency Virus Within a Non-Risk-Based Testing Strategy in Southern Health Systems Emergency Departments

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Study Objectives: The new epicenter of the ongoing Human Immunodeficiency Virus (HIV) epidemic is the southern United States. The emergency department (ED) has been emphasized as an unique and effective venue for screening patients for HIV. Our South Carolina based health system has operated a generalized "opt-out" HIV screening program in two of our major EDs for four years using support from the Frontlines of Communities in the United States (FOCUS) program. The objective of this study was to identify the number of missed opportunities (MO) for HIV diagnoses within our screening program and assess for any significant associated patient characteristics. This study also seeks to compare MO of FOCUS EDs with other Prisma Health Upstate EDs who do not yet participate in the FOCUS program.

Study Design/Methods: This IRB approved retrospective case-control analysis of adult patients (≥18 years) from August 1, 2019 to March 30, 2022, evaluated newly diagnosed HIV patients identified from any of seven Prisma Health Upstate EDs. Most patients (93.4%) were screened at Greenville Memorial Hospital (n=11,693, 60.2%) and Oconee Memorial Hospital (n=6443, 33.2%), two study sites with

primary systematic implementation of generalized HIV screening. MO were defined as any ED visit with testing for a sexually transmitted infection (STI) and no associated HIV screening test. We limited the search for MO in all our newly diagnosed HIV patients since the inception of our FOCUS program in 2019 which includes both generalized screening in two of six PRISMA EDS with risk-based HIV screening program in the remaining four. Demographic characteristics of all patients were evaluated by Chi-square and T-tests (as appropriate) and using multivariable logistic regression to assess significant individual patient characteristics using SAS Enterprise.

Results/Findings: Of 19,423 patients screened for HIV, 142 (0.73%) were positive for HIV infection. Of those positive, only 12 (8.5%) had a MO, three (25.0%) of which had two MO, while the remaining nine (75.0%) had only one. There were no significant differences in the distribution of demographics based on MO status, however the proportion of patients reporting a MO was significantly higher for those at non-FOCUS EDs compared to those visiting a FOCUS ED (41.7% vs. 13.9%, p=0.01). After adjusting for demographics, individuals seen at a non-FOCUS ED were nearly five times more likely to have a MO compared to those seen at a FOCUS ED (aOR=4.83, 95% CI= 1.21-19.33, p=0.02).

Conclusion: This study highlights that while our generalized "opt-out" screening using a non-risk-based strategy is effective in capturing local HIV positive individuals seen in our EDs, there was still a high percentage (8.5%) of patients who should have had HIV screening concomitantly with ED-based STI testing. Findings show a non-risked based approach to HIV testing in the emergency department is likely superior to testing based on risk factors alone.

No, authors do not have interests to disclose

66 The Use of Additional Imaging Studies after Abnormal Biliary Point-of-Care Ultrasound in the Emergency Department

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Background: Emergency-physician-performed point-of-care ultrasound (POCUS) of the gallbladder has been shown to achieve sensitivity and specificity for cholelithiasis and cholecystitis that are similar to that of radiology ultrasound (RUS). However, in our experience, additional diagnostic imaging studies (such as RUS or cholescintigraphy) are often performed after abnormal biliary POCUS to confirm the results. The utility of this strategy is uncertain. We thus sought to determine the test characteristics of biliary POCUS for cholelithiasis and cholecystitis in our hospital system, and to assess the usefulness of obtaining additional imaging after an abnormal biliary POCUS.

Methods: We conducted a retrospective chart review of patients who underwent biliary POCUS between May 4, 2018 and November 28, 2021 at our hospital or one of its two affiliated free-standing emergency departments. In order to be included in analysis, the patient must have had both a biliary POCUS and an additional comparative assessment of the gallbladder. Means by which the gallbladder may have been assessed for comparison included (in this order) pathological evidence from surgery, cholescintigraphy, RUS, abdominal CT scan, and return visit to the hospital. When a discrepancy existed between the biliary POCUS results and the results of a RUS or cholescintigraphy, the results of the RUS or cholescintigraphy were compared to a higher gold standard assessment (if available).

Results: A total of 664 records of patients who underwent biliary POCUS by 70 different sonographers were reviewed. For cholelithiasis, biliary POCUS had a sensitivity 97.8% (95% CI 93.6% to 99.5%) and a specificity 99.5% (95% CI 97.3% to 99.99%). For cholecystitis, biliary POCUS had a sensitivity of 83.8% (95% 72.9 to 91.6%) and a specificity of 98.6% (95% CI 96.4 to 99.6%). In total, 88 patients had both a RUS and a POCUS. The two ultrasounds were concordant for both the presence/absence of gallstones and the presence/absence of cholecystitis in 72/88 cases (81.8%). Based on gold standard assessments (pathologic evidence or cholescintigraphy), POCUS was actually correct in at least 8 (50%) of the 16 discrepant cases. Twenty-one patients in our study had cholescintigraphy and a cholecystectomy. From these, the test characteristics for cholescintigraphy were sensitivity 81.3% (95% CI 54.4 to 96.0%) and specificity 100.0% (95% CI 47.8% to 100.0%).

Conclusion: Emergency-physician-performed biliary POCUS has excellent sensitivity and specificity for cholelithiasis. The sensitivity of biliary POCUS for cholecystitis is lower, but the specificity remains very high. RUS should not be used as a gold standard test in future studies as biliary POCUS is at least as accurate as RUS. Performing a RUS or cholescintigraphy after an abnormal biliary POCUS adds little value and may lead to the incorrect diagnosis.

No, authors do not have interests to disclose

67 Tele-Emergency Care May Improve Access to Emergency Care Resources While Reducing Need for In-Person Emergency Department Evaluation

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Study Objectives: Access to timely emergency medical care is essential to the US health care system but can be particularly challenging for individuals in rural communities and those with physical impediments, strained economic resources, and increased susceptibility to nosocomial COVID-19 infection. Emergency care access is further impacted by emergency department (ED) crowding and limited resources. Telemedicine presents an innovative solution towards improving this access. We aim to evaluate the final disposition of patients utilizing the Veterans Health Administration Desert Pacific Veterans Integrated Service Network's (VISN 22) novel Tele-Emergency Care program (TEC) to describe the efficacy of this innovative option in increasing Veterans' access to care and conserving ED resource utilization.

Methods: Veterans who called the VA Clinical Contact Center (CCC) Monday through Friday, 7a to 7p PST, were triaged via a Triage Expert Dual Purpose protocol. If patients were triaged to a recommended follow-up interval (RFI) of needing medical care in either a 0-2-hour or a 2-8-hour time window, consenting patients were routed to the VISN 22 TEC program. TEC clinicians consisted of emergency physicians and experienced advanced practice providers. After evaluation, TEC clinicians recorded their final dispositions as: (1) Resolved (completing the care encounter virtually); (2) Referred to ED; (3) Referred to Urgent Care (UC); or (4) e911 Activated by Tele-ED Clinician (activating emergency medical transport). Care resolution included ordering of outpatient laboratory and/or imaging studies, outpatient prescription medications, or scheduled outpatient referral to Primary or Specialty Care for further evaluation. Veterans initially triaged to a virtual evaluation but who later declined seeing a clinician were labeled as "Patient Self-Cancelled".

Results: From March 2021 through April 2022, 7140 patients were referred to the 0-2-hour RFI and 9928 to the 2-8-hour RFI. Among those triaged to a 0-2-hour RFI, 3706 (51.9%) had their care resolved, 2697 (37.8%) were referred to an ED, 468 (6.6%) were referred to UC, 217 (3.0%) were cancelled by the patient, and 52 (0.7%) required e911 activation. Among those triaged to a 2-8-hour RFI, 6716 (67.6%) had their care resolved, 1949 (19.6%) were referred to an ED, 832 (8.4%) were referred to UC, 412 (4.1%) were cancelled by the patient, and 19 (0.2%) required e911 activation.

Conclusion: Prior to VISN 22 Tele-Emergency Care implementation, Veterans who called the CCC and were triaged to a 0-2-hour or a 2-8-hour RFI would be referred to the nearest ED or UC. TEC provided eligible Veterans with a virtual expert consultation option to address their acute care needs. After implementation, more than half of Veterans triaged to either a 0-2-hour or a 2-8-hour RFI had their care resolved virtually, potentially reducing low-value and low-acuity ED visits and preserving resources for higher acuity and critical patients. Further research is needed to assess which presenting complaints were most amenable to telehealth evaluation, the economic impact to the VA health care system, and the rate of short-term unanticipated ED or UC visits despite TEC case resolution.

No, authors do not have interests to disclose

68 Extracorporeal Membrane Oxygenation for Cardiac Arrest: Does Age Matter?

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Study Objectives: Literature addressing the impact of age on outcomes of patients receiving extracorporeal membrane oxygenation (ECMO) for refractory cardiac arrest is sparse. We sought to characterize the association between older age and outcomes from extracorporeal cardiopulmonary resuscitation (ECPR) for refractory cardiac arrest, using a large intentional database.

Methods: Data were obtained from the Extracorporeal Life Support Organization (ELSO) Registry. Patients 18 years or older whose indication for ECMO was ECPR between November 1st 2010 and October 31st 2020 were included. The primary outcome was the adjusted risk of in-hospital death, by age category. Secondary

outcomes included adjusted duration of ECMO support and hospital length of stay (LOS) by age category.

Results: A total of 5,120 patients were analyzed after exclusion criteria. The median age of ECPR recipients was 57 ± (IQR 46,66 years). In a model adjusting for several variables including cardiac and renal comorbidities, BMI, and pre-ECLS RRT, there was a significant decrease in the odds of survival by age category (OR for survival in the two oldest age groups 65-74 and >75 years versus the youngest age group 18-49 was 0.68, 95% CI 0.57–0.81 and 0.54, 95% CI 0.41– 0.69, respectively). As consistent with the unadjusted model, there was no significant difference in the odds of survival between the two youngest age groups (<65) or between the two oldest age groups (>65), suggesting a threshold for decreased odds of survival at age 65. For both secondary outcomes (hospital LOS and duration of ECMO), there was a trend toward younger patients having shorter ECMO run duration and shorter hospital LOS compared to older patients, however, this was not significant.

Conclusion: The odds of survival for patients with refractory cardiac arrest treated with ECPR diminishes with increasing age, particularly for patients over the age of 65. We found significantly decreased odds of survival over age 65, despite controlling for illness severity and comorbidities. Further studies are needed to confirm these findings and evaluate for other health-related confounding factors.

Table 2. Survival Models of ECPR by Age Category

	Estimate*	Odds ratio	Lower CI	Upper CI	p-value
Model 1 – Survival by Age Category, Unadjusted					
Group 2 (50 – 64)	-0.06	0.94	0.82	1.08	0.40
Group 3 (65 – 74)	-0.31	0.73	0.62	0.87	<0.001
Group 4 (≥ 75)	-0.48	0.62	0.48	0.79	<0.001
Model 2 – Survival of ECPR by Age, Adjusted for Pre-specified Variables					
Group 2 (50 – 64)	-0.10	0.91	0.79	1.05	0.19
Group 3 (65 – 74)	-0.39	0.68	0.57	0.81	<0.001
Group 4 (≥ 75)	-0.62	0.54	0.41	0.69	<0.001
Model 3 – Survival of ECPR by Age, Parsimonious Model with Interaction terms					
Group 2 (50 – 64)	-0.57	0.58	0.38	0.85	<0.001
Group 2 (65 – 74)	-0.59	0.55	0.33	0.94	0.03
Group 4 (≥ 75)	-0.79	0.45	0.17	1.20	0.11

*Group 1 (18 – 49 years) referent category

No, authors do not have interests to disclose

69 Improving Critical Care Documentation in an Academic Emergency Department via Point-of-Documentation Decision Support

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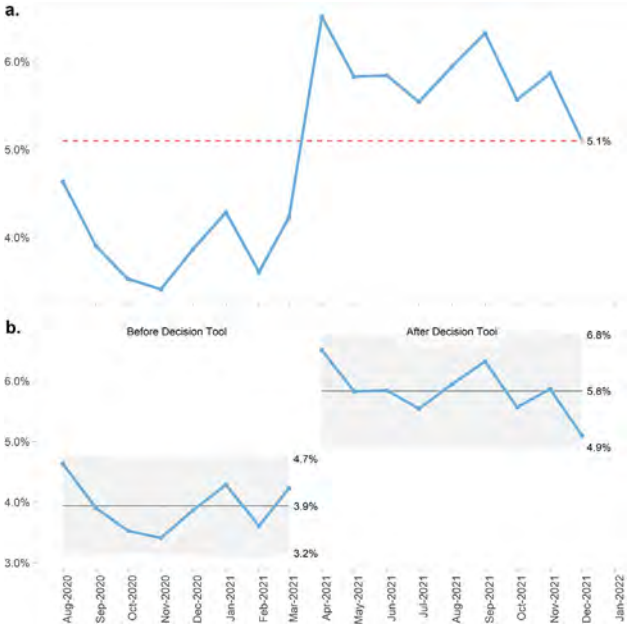
Study Objectives: Critical care services (CCS) documentation affects billing, operations, and research. No studies exist on electronic health record (EHR)-based decision support for CCS documentation in the emergency department (ED). We describe the design, implementation, and evaluation of a point-of- documentation decision support (PODDS) tool built to improve CCS capture.

Methods: This quality improvement project at Vanderbilt University Medical Center (VUMC) was motivated by a difference between our ED's CCS rates compared to national benchmarks. We used the "Five Rights of Clinical Decision Support" to design a PODDS tool to improve CCS capture. Using SNOMED-CT hierarchical concepts (SNOMED Intl. London, UK), ED diagnoses associated with CCS (eg anaphylaxis, aortic dissection) triggered a message to appear to attending physicians within attestation notes. Alert format, behavior, and phrasing were designed to raise awareness of diagnoses associated with CCS rather than recommending a particular documentation practice. A message approved by VUMC compliance appeared in the note saying, "This patient may have filed diagnoses associated with critical care." The message disappeared from the note automatically once signed to avoid inclusion in the legal medical record. After testing, we deployed the PODDS April 1, 2021. We measured CPT codes 99291 or 99292 for 8 months before and after deployment to identify CCS capture rates. We generated a run chart and used shift, run, and trend rules to evaluate for non-random change after implementation. Assuming evidence of a non-random change was found, we then planned to evaluate stability and characterize post-intervention performance using a Shewhart control chart (p-chart for proportional data) with separate control limit calculations before and after deployment. We set $\alpha = 0.05$ as the significance threshold. Charts were plotted in R using qicharts2.

Results: The run chart is shown in Figure a. The median proportion of CCS across the study period was 5.1%. After implementation, there were 8 consecutive months above the median, constituting a positive shift. There is only one run (crossing of the median line), which is fewer than expected given 17 total observations (lower limit is 5 runs), suggesting a non-random pattern. There were no trends (≥5 consecutive points changing monotonically). To further evaluate the stability of the observed change, we created a Shewart control chart (Figure b). Mean CCS proportions pre- and post-intervention were 3.9% (control limits 3.2 - 4.7%) and 5.8% (control limits 4.9 – 6.8%), respectively. There were no patterns suggestive of special variation in either group, suggesting distinct, but stable, performance distributions before and after the intervention.

Conclusion: PODDS can improve the capture of CCS in the ED. Attention to user workflows are critical to avoid alert fatigue and ensure compliance.



No, authors do not have interests to disclose

70 A Comparative Evaluation of 3D Printed Versus Standard Suture Materials

Langenfeld J, Reinhart B, Lyden E, Nguyen T/University of Nebraska Medical Center, Omaha, Nebraska, US

Introduction: Suturing is a primary method of laceration repair, affording clinicians the agency to manage a wide range of wound presentations. The capability to produce suture material on an ad-hoc basis may have applications in remote environments where supply or restocking options are limited. The use of 3D printing technology to produce medical equipment such as forceps and needle drivers has been described in the literature with overall positive results, but a preliminary search failed to identify literature on using 3D printing technology to produce suture material.

Study Objectives: To develop a process using 3D printing technology to manufacture suture material and to compare the usability of 3D printed versus commercially available nylon suture material.

Methods: The 3D printed suture material was manufactured using an Ultimaker S3 3D printer and nylon filament. The nylon filament was extruded through a 0.4 mm hot-end nozzle and further compressed to increase its tensile strength and to match the diameter to the thickness of standard 3-0 nylon suture. The 3D suture material was

attached to the needle by wrapping it around the proximal end of a curved needle and secured in place with cyanoacrylate adhesive glue. A convenience sampling of emergency medicine (EM) residents and faculty was conducted to enroll the study participants. Each was presented with 2 pigs' feet with a 2.5 cm subcutaneous laceration and tasked with performing laceration repairs using their suture technique of choice. The first repair was performed with commercially available 3-0 nylon suture, followed by the 3D printed suture material. Participants were asked to complete a 7-question post-study survey rating their experience with each. Paired t-tests were used to compare them at the $p<0.05$ level.

Results: Of 26 total participants, 25 were EM residents (11 PGY-1, 9 PGY-2, 5 PGY-3) and 1 EM faculty. Eighteen (69.2%) reported >40 previous laceration repairs, 7 (26.9%) reported 21-40, and 1 (3.8%) reported 1-20. Based on the survey data, traditional suture had a mean value of 8.7, 7.5, and 8.3 respectively when evaluated for pull through the tissue, knot tying, and user confidence in ability to maintain wound adhesion. 3D printed suture material had mean values of 7.1, 8.9, and 8.7 respectively when evaluated for the same parameters. There was no statistical significance between the two suture materials with regards to pull through tissue and confidence in ability to maintain wound adhesion. There was statistical significance in the rating of knot tying with the 3D printed suture rated 1.4 points higher than the standard suture on average ($p=0.0018$). Comparing usability between the 3D printed suture and traditional suture, 16 participants (61.5%) rated it as the same, 5 (19.2%) more usable and 5 (19.2%) less usable.

Conclusion: This study was successful in using 3D printing technology to manufacture suture material and provide insight into its usability compared to standard suture material. There was no statistical difference observed in pull through tissue or confidence in the material, but statistical significance was observed when assessing the materials' ability to tie knots with users commenting on the 3D printed suture's ease of knot tying, smoothness, and tensile strength. Limitations included a small sample size, unblinded participants, and needle attachment. Further investigation is warranted to address those and to explore clinical variables.

Survey Questions:	Results	Means (SD): Standard vs 3D
Q1: Current level of training	PGY1: 11, PGY2: 9, PGY3: 5, Faculty: 1	
Q2: Number of suture procedures performed	1-20: 1, 21-40: 7, 41-60: 11, 60+: 7	
Q3/5: Rate suture pull through tissue		8.7 (SD 1.5) vs 7.1 (SD 3.8)
Q3a/5a: Rate suture knot tying		7.5 (SD 1.9) vs 8.9 (SD 1.5)
Q4/6: Rate confidence in ability to maintain wound adhesion		8.3 (SD 1.9) vs 8.7 (SD 1.3)
Q7: Rate usability of 3D suture when compared to standard suture	Less: 5, Same: 16, More: 5	
Survey Comments Regarding 3D Printed Suture Material		
More usable with knot tying. Less usable with difficulty getting needle through the skin		
Difficult to push needle through skin. Ties better + holds knot better than non-3D		
The suture material was easier to tie and appeared to form a better knot, but my first needle couldn't get through the skin at all (at the attachment), second one the suture material came off the needle.		
Difficult to pull needle through tissue at site of suture-attachment of 3D printed suture		
Less usable b/c difficult to pull through tissue b/c of attachment of suture to needle, otherwise just as usable		
Need improved method of connecting suture to the needle but seems to hold initial tie better		
3D printed felt smooth, nice tensile strength		
Would prefer it if the needle was easier to pass through the tissue		
Needle on the 3D printed was a problem		
Easier through tissue. Felt more difficult to hold knot.		
3D printed did not twist, coil as much as commercial sutures		
Seemed similar. Was not hard to use		
Tied really well		
Difficult to assess pulling due to needle		
Really strong. I pulled hard		

Table 1: Summary of survey results and participant feedback

No, authors do not have interests to disclose

71 HIV Pre-exposure Prophylaxis in the Emergency Department: A Systematic Review

Nagy T, Ann Gormley MM, Moschella P, Lu Z, Rodriguez J, Roth P/Prisma Health - Upstate, Greenville, South Carolina, US

Background: Many emergency departments (ED) have identified the importance of HIV prevention and have implemented steps to screen and offer HIV pre-exposure prophylaxis (PrEP). However, there is limited consensus on the examination of eligibility and outcomes of PrEP in the ED to continue using this critical tool to decrease spread of HIV. The objective of this study was to systematically review existing literature that identify PrEP eligibility in the ED and summarize outcomes along the PrEP Cascade of Care (awareness, interest, linkage to treatment, initiation, adherence, and retention) for ED patients.

Methods: Five databases captured all PrEP-related studies in EDs from January 1st, 2013, to March 22nd, 2022. Data was extracted on study characteristics and outcomes and study quality was assessed using a modified quality assessment tool by the Effective Public Health Practice Project (EPHPP). Results of this study were reported according to the Preferred Reporting Items for Systematic Reviews and Meta Analyses (PRISMA).

Results: Of 218 articles, 16 were subjected to full-text review and 7 met inclusion criteria. Although most studies identified patients who were PrEP-eligible using criteria adapted from the 2017 CDC PrEP Guidelines, the number and time period for each criterion varied. Between 11.9-37.2% of those screened in the ED were eligible for PrEP. Six articles included outcomes on the PrEP Cascade of Care (Figure 1 Half reported the proportion of PrEP-eligible patients who were aware of PrEP (8.3-40.5%). Although five articles reported the proportion who were interested in HIV PrEP (2.3-46.4%) only half of the studies reported the proportion of participants who were linked to a follow-up PrEP appointment (2.3-19.4%), and only three studies reported the proportion of individuals who initiated PrEP treatment (1.2-2.2%) No articles reported adherence or retention to PrEP at 30-, 60-, or 90-days. Further, no articles detailed how responses to outcomes along the PrEP Cascade of Care differed by subpopulations at high-risk for HIV.

Conclusion: While up to a third of ED patients assessed in the current study were PrEP-eligible, less than half PrEP-eligible participants had prior knowledge of PrEP, and very few of those expressing interest in the ED were linked to PrEP treatment or initiated PrEP. Future research is necessary to identify strategies to increase PrEP education, interest, and linkage to care from the ED given many high-risk patients are seen through the ED in place of primary care.

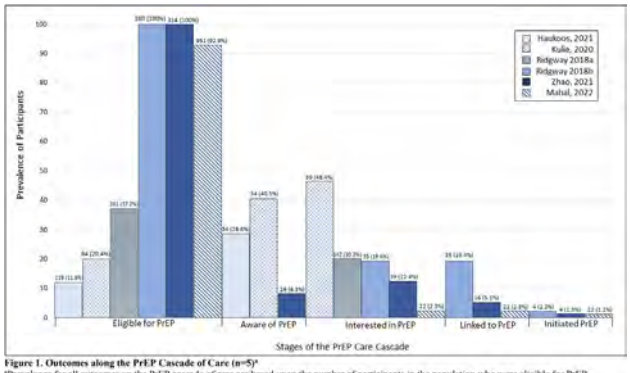


Figure 1. Outcomes along the PrEP Cascade of Care (n=5)*

*Prevalence for all outcomes on the PrEP cascade of care are based upon the number of participants in the population who were eligible for PrEP.

No, authors do not have interests to disclose

72 Association of Limited English Proficiency and Increased Emergency Department Waiting Room Lengths of Stay

Lim T, Campbell R, Jones D, Mullan A, Lichen I, Knier C, Bellamkonda V/Mayo Clinic Hospital, Rochester, Minnesota, US

Study Objective: Equitable health care relies on effective communication. Limited English proficiency (LEP) has been associated with disparities in emergency

department (ED) care. The primary objective of this study was to examine the association of LEP and ED waiting room lengths of stay (WR LOS).

Methods: We conducted a multicenter retrospective observational cross-sectional analysis of ED visits to multiple academic and community EDs across four states (AZ, FL, MN, WI) from November 1, 2018 through March 1, 2020. ED visits among patients 18 years of age or older were analyzed after accounting for inclusion and exclusion criteria. The primary outcome of interest was WR LOS measured as ED arrival time to patient room time. Patients with LEP were defined as any patient who reported a preferred language other than English. Associations between LEP and WR LOS were assessed using population-averaged Poisson generalized estimating equations calculated using Eicker-Huber-White robust standard errors. Multivariable models were adjusted for patient age, sex, arrival method, chief complaint, modified early warning score, emergency severity index level, arrival time of day, arrival day of the week, disposition, and ED location.

Results: A total of 420,329 ED visits were included for analysis. The mean patient age was 53.7 years and 55% were female. Eighty-eight percent of patients were White, 5.1% were Black, 1.5% were Asian and the remaining patients reported other races. Five percent of patients were Hispanic. English was the preferred language for 97.1% of patients. A total of 75 distinct primary languages were represented in the study cohort. The mean and median WR LOS for patients with LEP versus English proficiency (EP) were 31.9 and 21.8 minutes respectively, and 8.5 and 8 minutes, respectively. After multivariable adjustment, patients with LEP had a 9% longer median WR LOS (RR = 1.09, 95% CI: 1.06 – 1.12, p < .001) compared to patients with EP. Patients with preferred languages of Spanish, Arabic, and Somali had significantly longer adjusted median WR LOS compared to patients with EP with WR LOS increased by 6% (RR = 1.06, 95% CI: 1.01 – 1.11, p = .020), 13% (RR = 1.13, 95% CI: 1.07 – 1.19, p < .001) and 16% (RR = 1.16, 95% CI: 1.07 – 1,24, p < .001), respectively.

Conclusion: ED patients with LEP had significantly longer waiting room lengths of stay compared to patients with EP. Waiting room lengths of stay were longest among patients reporting Somali as their preferred language. Increased waiting room lengths of stay among patients with LEP may be related to language barriers, health care provider biases, and other structural factors. These findings highlight the need to improve communication and remove other structural barriers to reduce disparities in ED care.

No, authors do not have interests to disclose

73 Therapeutic Effects of Melittin Against Acetaminophen-Induced Liver Injury in Mice

Kim G, Kim JY, Lim J/Daegu Catholic University School of Medicine, Daegu, Daegu, KR

Study Objective: An overdose of acetaminophen (APAP) frequently causes severe liver injury, but the treatment options remain limited. Melittin is a bioactive peptide derived from bee venom and possesses anti-oxidative, anti- apoptotic, and anti-inflammatory properties. Emerging evidence suggests that this peptide exerts beneficial effects on several inflammatory disorders. However, whether melittin has a protective effect on APAP toxicity remains undetermined. The purpose of the current study was to investigate the effect of melittin on APAP-induced hepatotoxicity.

Methods: Melittin was intraperitoneally administered at a dose of 0.01 mg/kg to mice 1 hour after APAP injection (400 mg/kg).

Results: Administration of melittin after APAP injection reduced serum aspartate aminotransferase and alanine aminotransferase levels and alleviated histological alterations in APAP-injected mice. Melittin inhibited lipid peroxidation and DNA oxidation with restoration of glutathione content and upregulation of antioxidant enzymes. Melittin also attenuated hepatocyte apoptosis with inhibition of caspase-3 activation. In addition, serum and hepatic levels of cytokines were reduced by melittin. This effect was associated with inhibition of nuclear factor-κB activation. Furthermore, melittin attenuated infiltration of neutrophils and macrophages into the liver.

Conclusion: Altogether, these data suggest that melittin might be served as a treatment agent for APAP-induced hepatotoxicity.

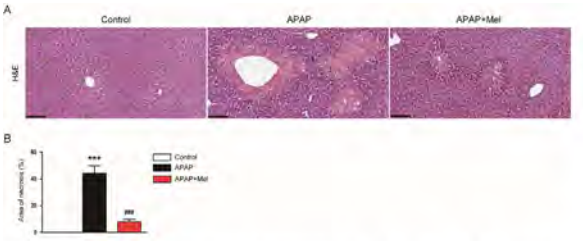


Figure 1. Effect of melittin on histological abnormalities. (A) H&E staining. Scale bar: 100 μm. (B) Percentage of ne-crotic area. n = 8 per group. *** p < 0.001 vs. Control. ### p < 0.001 vs. APAP.

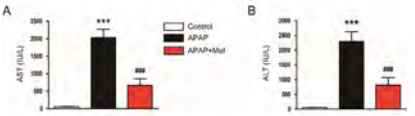


Figure 2. Effect of melittin on liver injury indicators. (A) Serum AST levels. (B) Serum ALT levels. n = 8 per group. *** p < 0.001 vs. Control. ### p < 0.001 vs. APAP.

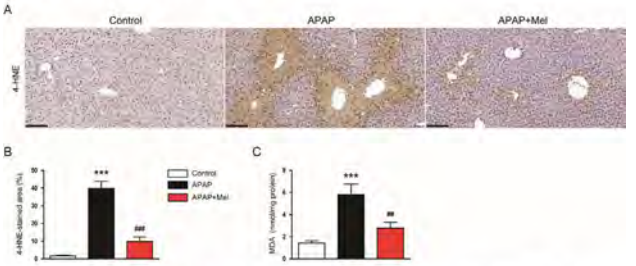


Figure 3. Effect of melittin on lipid peroxidation. (A) IHC staining of liver tissues for 4-HNE. Scale bar: 100 μm. (B) Percentage of 4-HNE-stained area. (C) Hepatic MDA levels n = 8 per group. *** p < 0.001 vs. Control. ## p < 0.01 and ### p < 0.001 vs. APAP.

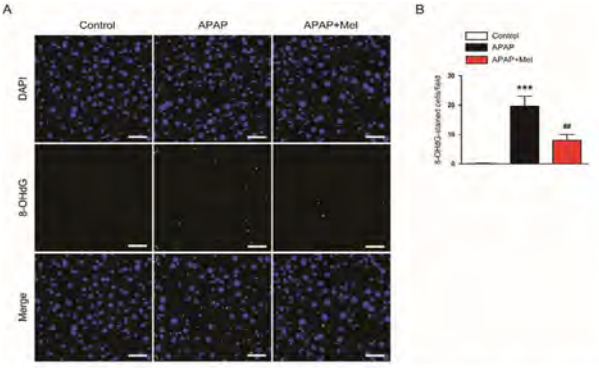


Figure 4. Effect of melittin on DNA oxidation. (A) IF staining for 8-OHdG (green). Scale bar: 40 μm. (E) Number of 8-OHdG-stained cells per field. n = 8 per group. *** p < 0.001 vs. Control. ## p < 0.01 vs. APAP.

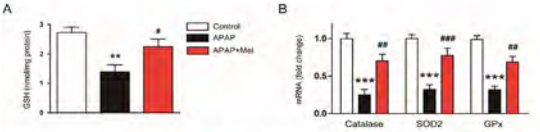


Figure 5. Effect of melittin on GSH content and antioxidant enzymes. (A) Hepatic GSH levels. (B) The mRNA levels of catalase, SOD2, and GPx. n = 8 per group. ** p < 0.01 and *** p < 0.001 vs. Control. # p < 0.05, ## p < 0.01, and ### p < 0.001 vs. APAP.

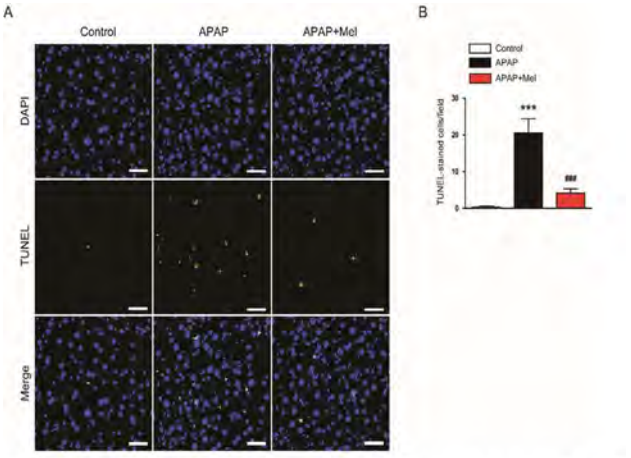


Figure 6. Effect of melittin on hepatocyte apoptosis. (A) TUNEL staining. Scale bar: 40 μm. (B) Number of TUNEL-stained cells per field. n = 8 per group. *** p < 0.001 vs. Control. ### p < 0.001 vs. APAP.

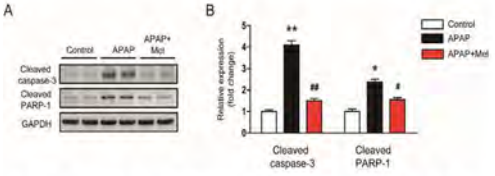


Figure 7. Effect of melittin on hepatocyte death and ER stress. (A) Western blotting of cleaved caspase-3 and cleaved PARP-1. (B) Quantification of western blot data for cleaved caspase-3 and cleaved PARP-1. n = 8 per group. * p < 0.05 and ** p < 0.01 vs. Control. # p < 0.05 and ## p < 0.01 vs. APAP.

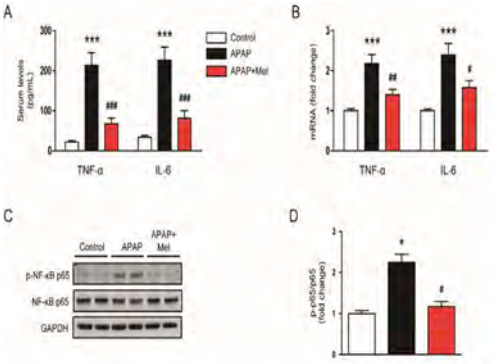


Figure 8. Effect of melittin on cytokine production and NF-κB activation. (A) Serum levels of TNF-α and IL-6. (B) The mRNA levels of TNF-α and IL-6. (C) Western blotting of p-NF-κB p65. (D) Quantification of western blot data for p-NF-κB p65. n = 8 per group. * p < 0.05 and *** p < 0.001 vs. Control. # p < 0.05, ## p < 0.01, and ### p < 0.001 vs. APAP.

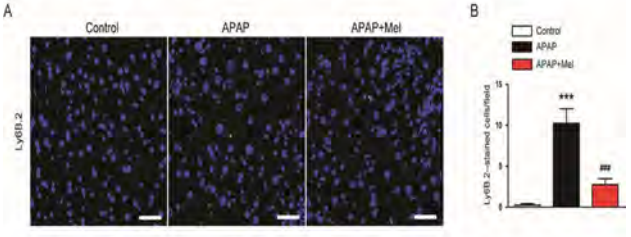


Figure 9. Effect of melittin on neutrophil infiltration. (A) IF staining for Ly6B.2 (green). Scale bar: 40 μm. (B) Number of Ly6B.2-stained cells per field. n = 8 per group. *** p < 0.001 vs. Control. ### p < 0.001 vs. APAP.

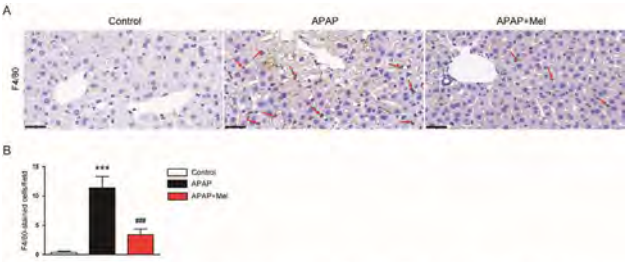


Figure 10. Effect of melittin on macrophage infiltration. (A) IHC staining for F4/80. Red arrows indicate positive cells. Scale bar: 30 μm. (D) Number of F4/80-stained cells. n = 8 per group. *** p < 0.001 vs. Control. ### p < 0.001 vs. APAP.

No, authors do not have interests to disclose

EMF 74

Early Phase Development of the PROM-OTED Tool: The Patient-Reported Outcome Measure – Older Adult Care Transitions from the Emergency Department

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Background: The majority of older adults evaluated in the emergency department (ED) are discharged back to the community (eg home or assisted living). ED-to-community care transitions represent a vulnerable time period for older persons and many face barriers in access to subsequent care and lack understanding of post-discharge care plans. Outcome assessments have historically relied on ED revisit rates, hospitalization, or mortality, which may fail to take into account salient patient-reported outcome measures (PROMs). Despite a recognized need for more robust metrics assessing the care of older adults, PROMs have not been developed for this population, particularly as they navigate ED-to-community care transitions.

Methods: In order to develop the new PROM-OTED tool to assess the ED-to-community transition, we performed a 6-phase pilot project. We included adults aged 65 and older who were cognitively intact and were discharged from the ED. In Phase 1, 25 participants completed semi-structured interviews intended to identify barriers experienced during ED-to-community care transitions. Our interview guide was informed by extant literature and a conceptual framework. In Phase 2, research team members performed item generation, in which candidate items were developed through findings from Phase 1 qualitative interviews and adaptation of items on existing PROMs. In Phase 3, we utilized member checking, in which 50 new participants ranked candidate items they felt important for inclusion within the final PROM-OTED tool. Phase 4 included 10 cognitive debriefing interviews, in which participants assessed candidate items for comprehensiveness, content validity, and comprehension. Remaining phases will include a modified Delphi approach to reduce the candidate items to an efficient and non-burdensome final PROM-OTED tool, and psychometric analysis of responses from at least 150 older adults who recently experienced an ED discharge care transition.

Results: Phase 1 identified four major barriers experienced by older adults during the ED-to-community care transition: 1) ED discharge process was abrupt with missing information regarding symptom explanation and performed testing, 2) navigating follow-up outpatient clinical care was challenging, 3) new physical limitations and fears hinder performance of baseline activities, and 4) major and minor ramifications for caregivers impact an older adult's willingness to request or accept assistance. Phase 2 generated 47 candidate items grouped into 4 domains: discharge process, care transition, symptoms & quality of life, and functional status & disability. Phase 3 quantitatively identified high- and low-scoring candidate items for inclusion in the final PROM-OTED tool. Phase 4 resulted in revisions to the wording of several candidate items.

Conclusion: Older adults experience unique barriers when navigating ED-to-community care transitions, with priority areas for measurement including domains

such as functional status and quality of life. Development and validation of the PROM-OTED tool will provide a means for patient-centered outcome assessment of interventions targeting ED-to-community care transitions among older adults.

No, authors do not have interests to disclose

75 Disparities in Emergency Department Wait Times for Female, Transgender Female, Black and Non-English-Speaking Patients

Canellas M, Perakis G, Pachamanova D, Lami OS, Tsiourvas A/University of Massachusetts Medical School, Worcester, Massachusetts, US

Study Objectives: Prolonged emergency department (ED) wait time is a significant barrier in access to medical care and timely diagnosis and treatment. Prior research has established that ED wait time disparities exist for non-white, non-male, and non-English speaking patients. However, disparities have been analyzed only for particular conditions or without controlling for patient condition. We study the existence of disparities in wait times of patients of different genders, races, primary languages, as well as transgender patients, while accounting for acuity, chief complaint, time of arrival, mode of arrival, patient age and vital signs as well as ED flow variables at the time of patient arrival.

Study Methods: This study was a retrospective review of 38,192 patient visits over eight months at a large, academic, level 1 trauma center. Patients with mental health or unknown chief complaints were removed from the dataset, leaving 32,418 patients in the final dataset. Linear regression models with wait time as the dependent variable and covariates representing patient characteristics (demographics, acuity, vital signs, chief complaint) and ED operational factors (time of day and week, flow of the ED at time of patient arrival) were used.

Results: Black (6 minutes; P 0.01), female (7 minutes; $P < 0.001$), transgender female (68 minutes; P 0.01), and non-English speaking (11 minutes; $P < 0.001$) patients have longer wait times despite controlling for similar chief complaints and modes of arrival. ESI 3 patients experienced the largest and most significant disparities in wait time (black: 8 minutes, P 0.03; female: 9 minutes, $P < 0.001$; transgender female: 123 minutes, $P < 0.001$; non-English speaker: 11 minutes, $P < 0.001$), while there were no significant differences in wait time for ESI 1 and 5 patients of different races or genders.

Conclusion: Evidence of racial, gender, and primary language disparities in ED wait times exists in mid- acuity patients despite controlling for patient demographics, chief complaints, modes of arrival, and ED operational factors at the time of patient arrival. Transgender females had the largest disparity in wait times.

No, authors do not have interests to disclose

76 A Report on 83 Patients with Suspected Methanol Poisoning from Philippine Coconut Wine (Lambanog) Seen at East Avenue Medical Center: A Case Series

De Luna KA/East Avenue Medical Center, Quezon City, Metro Manila, PH

Background: Lambanog or Philippine Coconut wine is locally made distilled alcohol made from coconut sap and is well known for its strong alcohol content (40-45%). Severe methanol intoxication from Lambanog wine is rare but frequently lethal. Poor prognosis criteria include coma and seizure and severe metabolic acidosis. We present epidemiological and clinical data from a recent toxicologic mass casual incident involving suspected methanol poisoning. The management of methanol poisoning includes standard supportive care, correction of metabolic acidosis, administration of folinic acid, provision of an antidote to inhibit the metabolism of methanol to formate, and selective hemodialysis to correct severe metabolic abnormalities and enhance methanol and formate elimination.

Objectives: The objective of this paper is to document the profile and incidence of suspected acute methanol poisoning in a series of 83 patients presented at East Avenue Medical Center on December 23-24, 2019 and to correlate their laboratories to the severity of their symptoms.

Results: 67% of patients were initially tagged as green, 32% yellow patients and 1% red patient. 63 out of 83 patients were discharged with no signs and symptoms while 20 patients were admitted due to metabolic acidosis and signs and symptoms of methanol poisoning. One patient had undergone hemodialysis. Mean capillary blood glucose of patients was 100 mg/dL with initial blood gas mean ph of 7.270 and mean bicarbonate of 16 mmol/L. Most common symptoms were abdominal pain, blurring of vision, chest pain, dizziness and vomiting. Methanol level from lambanog samples tested ranges from 11-18%.

Discussion: This paper emphasizes the importance of early recognition in the out-of-hospital setting of suspected methanol poisoning to prioritize transfer of patients to the appropriate facilities. Frequent reassessment is critical because methanol can present with delayed complications which can be life-threatening

CASE	Duration post-ingestion (hours)	HCO3	Methanol (Blood) mg/L	Methanol (Urine) mg/L	Formic Acid (Urine) mg/L	Formic Acid (Blood)
1	6hours	5.8	380 mg/L	250 mg/mL	4400	0
	12 hours	11.5				
	24 hours	6.3				
	36 hours	18				
2	12 hours	11.4	410 mg/L	30mg/mL	5700	0
	24 hours	12				
3	48 hours	9	280 mg/L	80 mg/mL	6100	0
	52 hours	9.9				

No, authors do not have interests to disclose

77 Results of a Novel National Emergency Department Chief Complaint Database

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Study Objectives: Emergency department (ED) chief complaint data has several potential applications, including quality measurement, syndromic surveillance, operations, research, and education. However, there are no consistent methods to categorize ED chief complaints or evaluate their association with other ED outcomes, which has limited the utility of this type of data. To advance chief complaint data standardization, we report the initial results of a novel national ED chief complaint dataset under development in the Veteran Health Administration (VA). We identified common presenting ED chief complaints, characterized their associations with an ED discharge diagnosis of an emergent condition, and related admission rates.

Methods: This was a retrospective observational study of VA ED visits in FYs 2018-2020. A Natural Language Processing (NLP) program based on cTAKES, an Apache open source project, was applied to the original text of VA ED chief complaints. Results were mapped to Concept Unique Identifiers (CUI) in the Unified Medical Language System (UMLS). Multiple concepts could be identified from a chief complaint text entry. ED discharge diagnoses were defined by ICD-10 codes. Emergent diagnoses were selected based on a previously established list of codes for Emergency Care Sensitive Conditions (ECSCs), which are acute illnesses that require timely, quality emergency care to improve morbidity and mortality.

Results: A total of 5,898,684 VA ED visits were identified with at least one ED chief complaint and a discharge diagnosis. 59% of visits had 1 chief complaint concept, 26% of visits had 2 concepts, 10% had 3 concepts, 4% had 4 concepts, and 1% had 5 concepts. The 10 most common chief complaints, associated rates of an ECSC discharge diagnosis, and respective admission rates for both ECSC and non-ECSC ED visits are depicted in Table 1. Among the most common chief complaints, dyspnea had a majority of ED visits with an ECSC diagnosis, likely due to the COVID-19 pandemic. Otherwise, rates of ECSC visits varied from 24% (coughing) to 5% (back pain). However, admission rates for ECSC visits ranged from 67% (abdominal pain) to 15% (pharmaceutical preparations).

Conclusion: To our knowledge, this national ED chief complaint dataset is the largest in the country, and representative of a diverse patient population (ie by age, region, rurality). Initial work has highlighted areas for refinement of this dataset.

Further work is ongoing to examine combinations of chief complaints to better predict ECSC diagnosis and admission rate given the variation in initial findings. Additionally, ongoing work to improve context detection and reduce mapping errors is underway, and will improve utility in multiple applications.

Table 1

Concept Unique Identifier	Total ED visits (% of all ED visits)	ECSC vs Non-ECSC	Percent ECSCs and Non-ECSC within concept	Percent of ECSC and non-ECSCs admitted
Dyspnea	332880 (6)	ECSC	53	58
		Non-ECSC	47	33
Chest Pain	287825 (5)	ECSC	23	61
		Non-ECSC	77	31
Coughing	235539 (4)	ECSC	24	30
		Non-ECSC	76	5
Abdominal Pain	190149 (3)	ECSC	17	67
		Non-ECSC	83	21
Pain	183600 (3)	ECSC	7	47
		Non-ECSC	93	8
Back Pain	162018 (3)	ECSC	5	35
		Non-ECSC	95	5
Falls	165614 (3)	ECSC	16	49
		Non-ECSC	84	17
Pharmaceutical Preparations	125952 (2)	ECSC	7	15
		Non-ECSC	93	4
Dizziness	120301 (2)	ECSC	19	44
		Non-ECSC	81	20
Headache	109865 (2)	ECSC	8	32
		Non-ECSC	92	7

No, authors do not have interests to disclose

78 Regional Health Care Programme Partnering General Practitioners to Reduce Low Acuity Attendance at the Emergency Department: GPFirst

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Study Objectives: To evaluate the impact of a general practitioner (GP) programme on low-acuity patient load (patient acuity scale P3 or P4) presenting at a participating emergency department (ED) of a regional public hospital in Singapore. Secondly, to analyse the appropriateness of participating GPs' referrals to ED based on programme criteria.

Study Design/Methods: This is a descriptive observational study of a regionally implemented, government funded programme called GPFirst, from 2014 to 2019 (pre-COVID). In this programme, a patient attended to at a GPFirst clinic and subsequently referred to ED, will qualify for an ED attendance fee discount. Data are retrospectively collected from referral letters of GPs participating in the programme and the hospital's electronic health record system.

Results/Findings: During the study period, 207 GPs were progressively enrolled. The annual number of low acuity attendances reduced from 62,213 in 2013 (pre-GPFirst) to 53,480 in 2019 even though the annual number of ED attendances increased gradually from 138,784 in 2014 to 141,072 in year 2019. Moreover, the annual proportion of low-acuity, self-referred cases decreased from 63.4% (39,425) in 2013 to 57.1% (30,528) in year 2019. The annual percentage of GPFirst referrals to the ED which meet referral appropriateness criteria increased from 94.5% (FY2014) to 97.6% (FY2019) and 98.0% (FY2020). Overall, the roll out of GPFirst appears to coincide with a reduction in low acuity patient load without compromising the appropriateness of GP referrals to the ED.

Conclusion: A multi-faceted regional programme which included campaigned public education, regular GP continuous education, a supportive administrative team and financial incentive for patients, is able to reduce low acuity attendances. An ecosystem emerges which contributes to GPFirst's success. Further research is needed to evaluate safety and the effects of scaling this programme to a national level.

No, authors do not have interests to disclose

79 Association of Limited English Proficiency and Irregular Emergency Department Departures and Return Visits

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Study Objectives: Patients with limited English proficiency (LEP) have been shown to experience disparities in emergency department (ED) care. The objectives of this study were to examine the associations between LEP and irregular ED departures or return visits within 72 hours or 7 days.

Methods: We conducted a multicenter cross-sectional analysis of 20 EDs within an integrated health system in the upper Midwest from January 1, 2018, to December 31, 2021. ED visits of pediatric and adult patients who were discharged from the ED on the index visit were included for analysis. LEP was defined as any patient who had a preferred language other than English. The primary outcomes of this study were irregular departures (elopement, left against medical advice, left without being seen, and left before treatment complete) and return visits within 72 hours and 7 days. Multivariable models were adjusted for patient age, sex, index ED region, means of arrival, arrival day of the week and time of the day, chief concern, triage emergency severity index, modified early warning score, and severity-weighted Charlson comorbidity score. Adjustment for index visit disposition (discharge or irregular disposition) was also included for analysis of ED return visit rates. Rates were calculated using generalized estimating equations and reported as odds ratios (OR) with 95% confidence intervals (CI).

Results: There were 845,612 total ED visits analyzed, including 32,221 (3.8%) visits among patients with LEP. The mean (SD) age among patients with LEP was 30.9 (23.0) years and 40.1 (25.3) years among patients with English proficiency (EP). The most common language among patients with LEP was Spanish (14,807; 46%), followed by Somali (6,273; 19.5%), and Arabic (3,501; 10.9%). Irregular departures occurred in 830 (2.6%) ED visits among patients with LEP and 16,773 (2.1%) ED visits among patients with EP. After multivariable adjustment there was no difference in irregular departure rates between ED visits among patients with LEP or EP (OR = 1.02, 95% CI: 0.91 - 1.14, p = .74). Return ED visits within 72 hours occurred in 1,688 (5.2%) ED visits among patients with LEP and 42,167 (5.2%) ED visits among patients with EP. After multivariable adjustment there was no difference in 72-hour return rates between ED visits among patients with LEP or EP (OR = 1.01, 95% CI: 0.94 - 1.08, p = .82). Return ED visits within 7 days occurred in 2,597 (8.1%) ED visits among patients with LEP and 65,144 (8.0%) ED visits among patients with EP. After multivariable adjustment there was no difference in 72-hour return rates between ED visits among patients with LEP or EP (OR = 1.06, 95% CI: 1.00 - 1.12, p = .056). When 72-hour and 7-day return visits were analyzed separately among pediatric or adult patients, no statistically significant difference was found in return rates between patients with LEP and EP.

Conclusion: After multivariable adjustment, we did not find an increased risk of irregular ED departures among patients with LEP compared to patients with EP. To our knowledge, this is the first study to assess for disparate rates of irregular ED departures based on patient English proficiency. In contrast to some, but not all, prior studies, we also did not find an increased risk of return ED visits among patients with LEP compared to patients with EP. Further studies are needed to better understand and mitigate risk factors for adverse medical outcomes among patients with LEP.

No, authors do not have interests to disclose

80 Identifying Positive Deviant Nurses in the Speed of Administering Antibiotics for Sepsis and Discovering Their Tactics

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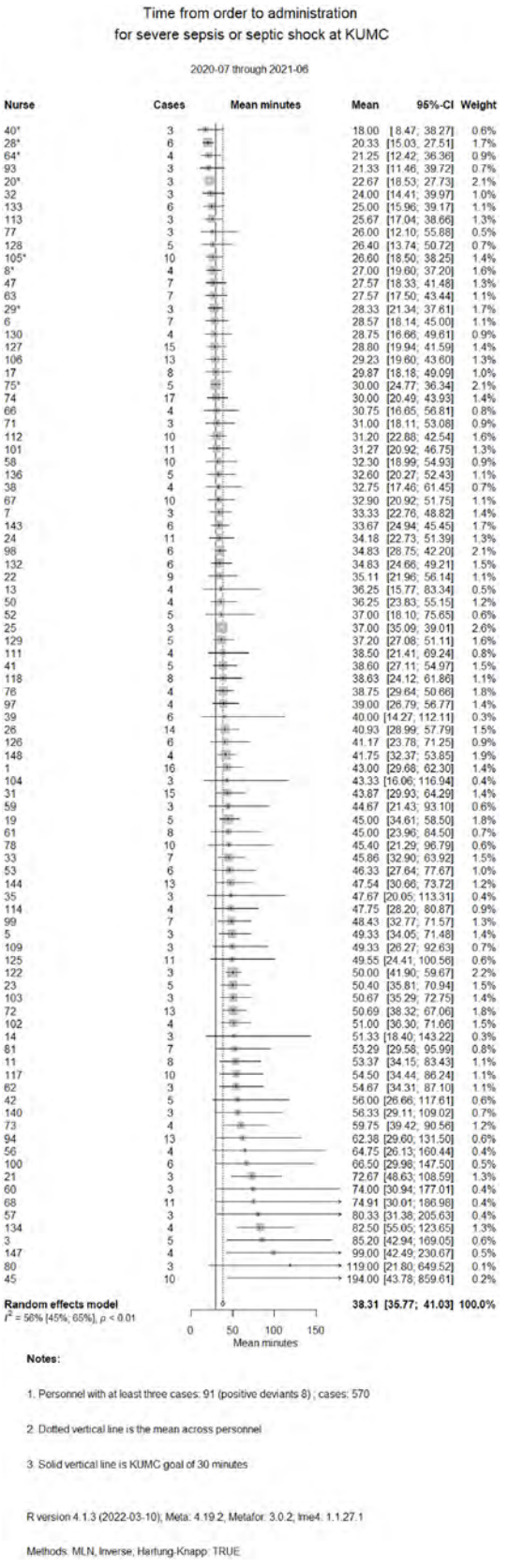
Study Objectives: Positive deviance (PD) is an application of complexity leadership theory that fosters organizational learning of difficult tasks. PD may also be able to avoid the increased burnout associated with the top-down management tactics of traditional quality improvement (QI). We assessed whether PD may be an appropriate strategy to improve sepsis care by testing for the presence of heterogeneity in nursing antibiotic administration time (AAT) for severe sepsis or septic shock patients and identifying the positive deviant nurses. We then aimed to discover the tactics utilized by these bright spots.

Methods: We included all nurses who cared for at least three patients with severe sepsis or septic shock who presented to the University of Kansas emergency department over a 12-month period (July 2020 through June 2021). We measured the percent heterogeneity (I2) of AATs with random effects analyses. Then, the positive deviant nurses were identified as the individuals whose mean AAT and confidence interval were faster than the mean AAT of all nurses. The results were displayed in a forest plot. To discover tactics utilized by the positive deviant nurses, a redcap survey was designed and distributed to all ED nurses including the positive deviant nurses.

Results: 575 patients were included. Random effects analyses showed statistically significant heterogeneity with 'substantial' I2 value of 56%. There were 8 positive deviant nurses. Redcap survey was distributed to 125 nurses including the 8 positive deviants. 41 nurses completed the survey including 5 positive deviants. Analyzing the survey, we discovered tactics that associated with shorter AATs. These include prioritizing antibiotics over other orders (eg, other medications, IV fluids, orders requiring blood draw), informing providers when concerned about a patient, drawing lactate and cultures when infection is suspected without waiting for provider orders, asking providers whether antibiotics are needed, and notifying providers when having difficulty placing an IV line. We also discovered that IV therapy consultation is likely associated with delays in AAT.

Conclusion: We noted heterogeneity in nurse AAT. Some nurses on average demonstrated quicker AATs compared to peers. Considering the practice environment is fairly constant, the heterogeneity in mean AAT suggests differences in practice patterns. These results support the role of a positive deviance approach to QI in identifying and disseminating best tactics within our emergency department. Prioritizing antibiotics over other orders, drawing lactate and cultures when suspecting infection, and early communication with providers on nursing concerns including lack of IV access are among tactics associated with shorter AATs.



No, authors do not have interests to disclose

81 Development of a Novel Emergency Department Quality Measure to Reduce Very Low-Risk Syncope Hospitalizations

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Study Objectives: Emergency department (ED) evaluations for syncope are common, representing 1.3 million annual US visits and $2 billion in related hospitalizations. Despite a growing evidence-base supporting clinical risk stratification and outpatient management, wide variation in syncope hospitalization rates persist. In order to address low-yield hospitalizations, we sought to develop a new quality measure for very low risk ED adult syncope patients who can be incorporated into performance improvement programs using national administrative data.

Methods: We developed this quality measure in two phases. First, we used an existing prospective, observational ED patient dataset to identify a very low-risk cohort with unexplained syncope using two variables: age under 50 years and no history of heart disease. We then applied this across a national sample of ED visits using the

2019 Nationwide Emergency Department Sample (NEDS) to assess its potential impact, assessing for hospital-level factors associated with admission variation.

Results: Of the 8,647 adult patients in the prospective cohort, 3,292 patients (38.5%) fulfilled these two criteria: Age under 50 and no history of heart disease. Of these, 15 (0.4%) suffered a serious adverse event within 30 days post-ED visit. In the NEDS, there were an estimated 566,031 patients meeting these two criteria, of whom 15,507 (2.7%) were hospitalized. We found substantial variation in hospitalizations rates for this very low- risk cohort, with a median hospitalization rate of 1.7%, (range: 0-100%, interquartile range: 0-3.9%). Hospital factors associated with increased hospitalization rates included yearly ED visit volume >80,000 (Odds Ratio [OR]: 3.14, 95% Confidence interval [CI]: 2.02 to 4.89) and metropolitan teaching status (OR: 1.5, 95% CI: 1.24 to 1.81).

Conclusion: In sum, our novel syncope quality measure is a simple method to assess variation in low value hospitalizations for unexplained syncope. Application of this measure could improve the value of syncope care.

No, authors do not have interests to disclose

82 Beyond the Breaking Point: Hospital Occupancy and Emergency Department Boarding During COVID- 19

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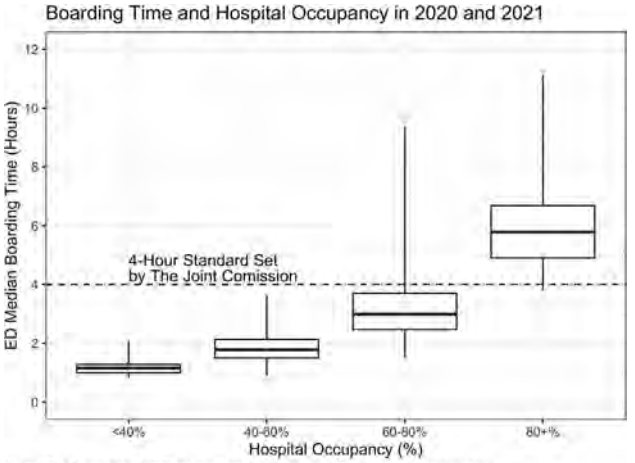
Study Objectives: To describe trends in hospital occupancy, emergency department (ED) median boarding time, and ED left without being seen (LWBS) rates in national sample of 1,769 hospitals in 2020 and 2021.

Methods: This study utilized aggregated hospital-level operational measures available through a peer benchmarking service offered by Epic Systems Corporation to its customers. The benchmarking service confidentially compares the performance of organizations that opt to utilize the service. Measures were analyzed on a monthly basis for all months from January 2020 through December 2021. The analysis sample included 1,769 unique hospitals across 331 organizations in the U.S.. Measures were first calculated at the hospital- level, and then aggregated statistics including median and percentiles for those measures were reported across all hospitals utilizing the service, as well as for subsets of those hospitals within each U.S. Census Region (Northeast, Midwest, South, West). Hospital-level operational measures of strain included hospital occupancy (percentage of staffed inpatient beds that are occupied), ED median boarding time (the median wait in the ED for patients from decision to admit to transfer out of the ED to an inpatient bed), and percent of ED visits resulting in patient leaving prior to clinical evaluation or left without being seen (LWBS).

Results: The median of ED median boarding time across all 1,769 hospitals was 2.00 hours in January 2020, fell to a nadir of 1.58 hours in April 2020, and rose throughout the study period to a high of 3.43 (a 71% increase from January 2020) as of December 2021. Hospital occupancy rates were at their highest in January 2020 at a median of 69.7%, nadired at 48.7% in April 2020, and rose again to a high of 67.2% by September 2021. Occupancy rates and boarding time varied greatly and exhibited a threshold relationship where occupancy exceeded 80%. In those cases, ED median boarding time rose to a median across hospitals of 5.78 hours, and a 95th percentile of 8.60 hours. At the end of 2021, amongst the worst performing hospitals in the 95th percentile by these operational measures, half of admitted ED patients 9 hours or longer for an inpatient bed, and more than 1 in 10 patients who present to the ED leave prior to an evaluation.

Conclusion: Where hospital occupancy exceeded 80%, ED boarding rose far above the 4-hour standard set by The Joint Commission. Hospital occupancy was relatively static over time while ED boarding times and LWBS rates exhibited much more dramatic variation and peaked at the end of 2021. Policymakers must address dynamic crises of acute care system strain in future waves of the COVID-19 pandemic and other disasters, or risk further erosion of hospital system capacity, unsafe patient and health care worker conditions, and excess mortality.



Notes: The figure depicts ED median boarding time according to hospital occupancy.
Results aggregated by month, in a sample of 1,769 hospitals in the U.S. in 2019 and 2020.
Bars represent the 75th, 50th, and 25th percentile (top to bottom).
Lines depict range from 95th percentile to 5th percentile (top to bottom).

No, authors do not have interests to disclose

83 An Interim Reporting of Trigger Point Injection for Myofascial Pain Syndrome (T-PIMPS): A 3-Arm, Partially Blinded, Randomized Controlled Trial

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Background: Low back pain (LBP), accounts for approximately 2.63 million ED visits in the United States, accounting for $100 billion in health care costs annually. Studies have shown that trigger point injections (TPI) are beneficial. These studies suffer from small sample size, lack of randomization, and lack of follow up. This is the first study to compare standard treatment (ST) to TPI with local anesthetic and TPI with normal saline (NS) for LBP in the emergency department (ED). Our primary objective will be to determine which is the superior treatment of low back pain at 30 minutes by comparing the change in pain. The secondary outcome will the change in a low back pain on a functional score at 30 minutes. Tertiary outcomes will be repeating both of these measures at 60-72 telephonic follow-up.

Methods: This study is a prospective 3-armed randomized controlled trial conducted in the ED at Madigan Army Medical Center (MAMC). Participants will be selected from patients presenting with: low back pain, who are over the age 17 years, are not pregnant, and have no findings consistent with emergent etiologies such as cauda equina. The three arms are ST, ST plus TPI with 8 mL of 0.5% Bupivacaine, and ST plus TPI with 8 mL NS. ST is single blinded and the two TPI arms are double blinded. Our power calculation yielded 43 subjects per group to detect a difference of 1.5 cm on a 10 cm visual analog scale (VAS). We increased that number to 60 to account for those lost to telephone follow-up at 60-72 hours. Our study total is 180 study participants. Data collected on a VAS will be analyzed via ANOVA. Modified Oswestry Disability Index (MODI) scores have been previously validated as a functional score for evaluating back pain. We will use change in MODI scores as our secondary outcome, which will be analyzed via the Chi-squared test.

Results: To date, we have screened 172 participants and enrolled 76. Six have withdrawn, and three have been lost to follow-up. Our estimated sample size can tolerate a total drop-out rate of 16% and we are currently at 12%. More participants

have left the study than reported any side effects. Those consist of soreness, and bleeding controlled by a commercially available self-adhesive bandage.

Conclusion: TPIs are a popular treatment for LBP in the ED. This is the first TPI study to compare ST to TPI with local anesthetic, and TPI with NS for LBP conducted in ED and that includes follow-up. We are hopeful that this study will answer whether or not trigger point injections are benefiting our patients and, if so, which type of TPI is most beneficial. At the moment we have not enrolled enough participants to meaningfully answer this question. However, we are approaching 50% of our enrollment goal, with an appropriate buffer for participants who may drop-out of the study. To date our participants have only experience minor discomfort.

Special acknowledgment to our mentor Dr. Kyle Couperus.

No, authors do not have interests to disclose

84 Bystander CPR Rates for Out-of-Hospital Cardiac Arrest Higher in Rural Areas Versus Urban Areas

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Study Objective: Survival from out-of-hospital cardiac arrests (OHCA) remains lower in rural areas compared to urban and suburban area. Limited access to health care resources and longer EMS response times suggests that rural OHCA survival may rely more on bystander intervention than in more populated areas. This study compares the rates of bystander CPR in cases of OHCA between rural and urban areas and examines social factors associated with bystander CPR.

Methods: This study was a national cohort study using merged county-level data from the National Emergency Medical Services Information System (NEMSIS) sample from 2019 and 2020, the 2019 American Community Survey, and the Bureau of Healthcare Workforce data. We included all adults (age$\geq$18) with OHCA who were treated by an EMS provider reporting data to NEMSIS, with the primary exposure of OHCA rurality, and the primary outcome of bystander CPR by a member of the public. Rurality was assigned using the Rural Urban Commuting Area code associated with the OHCA location. Cases were excluded if EMS resuscitation attempts were withheld. The association between rurality, community level covariates, and bystander CPR were measured using multivariable logistic regression.

Results: A total of 278,016 OHCA patients were identified and 63.8% (177,335) received bystander CPR. Patients with OHCA living in large rural cities (OR 1.27, 95% CI 1.18—1.36), small rural towns (OR 1.25, 95% CI 1.09—1.44) and isolated small rural towns (OR 1.61, 95% CI 1.40—1.86) were more likely to have bystander CPR when compared to those living in urban cities. Rurality remained associated with higher bystander CPR in our multivariable adjusted model ($p<0.0001$). Factors associated with increased odds of bystander CPR included higher proportion of Caucasian population in the county ($p=0.0001$), higher proportion having at least a college associate degree ($p<0.0001$), lower median income ($p<0.0001$) and lower proportions aged over 64 years ($p<0.0001$).

Conclusion: Rates of bystander CPR were higher in rural cities and towns than in urban areas. Counties with a higher percentage of Caucasian residents, younger population, more educated population, and lower median income were more likely to have higher bystander CPR rates. Future studies should focus on identifying regions with poor bystander CPR rates to improve rates as well as identifying alternative countermeasures to improve OHCA outcomes in rural areas.

No, authors do not have interests to disclose

85 An Assessment of Out-of-Hospital Provider Education and Sequelae Around Breaking Bad News

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Background: Emergency Medical Services (EMS) providers are often tasked with the delivery of bad news including making death notifications and informing loved ones about the termination of resuscitations. Currently, there are no national curricula or standardized trainings on this subject that are tailored to the unique challenges presented by the out-of-hospital environment. Our goal was to determine if out-of-hospital providers are receiving training on delivering bad news, how frequently they deliver bad news, and to explore sequelae arising from these experiences.

Methods: We conducted an electronic, cross-sectional survey of US EMS providers using specialty-based social media groups and direct e-mail. We asked 16-closed and one open-ended question. Items assessed providers' frequency of delivering bad news, related training, and experiences or sequelae from doing so. Quantitative responses were summarized using numbers and percentages while qualitative responses were analyzed using qualitative description.

Results: 1113 participants responded, across all US states. The majority (933/1111, 84%) report having delivered bad news at least several times in the last year, including sharing that a loved one had died (896/1041, 86%). Many reported receiving no education on this topic (422/1001, 42%) and only 26% (226/864) who have received training indicated that their education was sufficient. 96% (953/991) of participants reported that additional training would be helpful. 54% (528/964) reported experiencing some negative sequelae (intrusive thoughts, lost sleep, emotional difficulty) in the last year related to delivering bad news and 7% (71/964) experienced these effects frequently.

Conclusion: EMS providers are frequently responsible for delivering bad news, receive little education in this area, and generally feel their training is insufficient. More than half endorsed experiencing negative sequelae associated with this difficult work. The vast majority of providers feel additional training would be helpful. The development and implementation of training on breaking bad news that addresses the unique concerns of the out-of-hospital environment is indicated.

Table 1. Exemplar Quotes

It's the worst part of my job. I had to "code" my own late wife 7 years ago, and now every code I go to brings it all back and messes me up for weeks. I vomit each morning before leaving for work in anticipation of what I'm going to encounter, and I can never sleep for more than a couple hours at a time.
I hate relaying bad news to family. I am wholly untrained and unprepared for this. It does the family a disservice and makes me feel terrible.
I recently had to confirm to a family that the husband had passed due to suicide. The screams and cries of the wife still stick with me. She couldn't even call her parents. She asked me to do it. She was shaking and sobbing. I still don't know if I made the right choice or not.
When I told a patient's brother that we were stopping resuscitation efforts he got very angry. We were in a bad part of town. He left and came back quickly with hands in pockets. We were not sure if had a gun but body language pointed toward the possibility. I was in fear for my life at that time.
I think the hardest it has been for me was when I told a mother her daughter was dead. It was particularly difficult because they were on vacation and in a parking lot. I still remember her screaming when CPR was ceased.

No, authors do not have interests to disclose

86 Short-Term Outcomes and Patient Perceptions After EMS Non-Transport During the COVID-19 Pandemic

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Study Objectives: EMS frequently encounters patients who decline transport. During the COVID-19 pandemic, many EMS systems implemented non-transport protocols for stable, low-risk patients with suspected COVID-19 to reduce the burden on overwhelmed EDs. There are little data to inform the safety of patient and/or paramedic-initiated Assess, Treat and Refer (ATR) protocols. We aimed describe patient perceptions and short-term outcomes after non-transport by EMS during the COVID-19 pandemic.

Methods: This was a prospective, observational study of a random sample of patients evaluated and not transported by EMS from August 2020 to March 2021 in a regional EMS system. We utilized the EMS database to randomly select a daily sample of adult patients for whom the disposition was ATR. ATR was authorized for stable, low-risk patients, based on paramedic assessment, and for patients requesting non- transport without paramedic concern for an ongoing emergency condition. We excluded those who signed out against medical advice (AMA), were in police custody, and sting-ray envenomation. Trained investigators contacted patients by phone to administer a standardized survey regarding symptom progression, follow-up care, and satisfaction with non-transport decision. Initial recontact of patients was attempted at 72-hours from the EMS encounter, and then daily until contact or three attempts were made. We determined the proportion of patients who re-contacted 9-1-1 within 72 hours by querying the EMS database, and unexpected deaths within 72-hours using coroner data. Descriptive statistics were calculated.

Results: Of 4613 non-transported patients, 1283 were excluded including 1036 who signed out AMA, 153 in police custody, 68 stingray envenomation, and 26 misclassified runs. The remaining 3330 patients for whom the disposition was ATR were included. Patients were 46% male and median age was 49 (inter-quartile range

(IQR) 31-67). Median vital signs measurements fell within the normal range. Investigators successfully contacted 584 patients (18%). The most common reason for failure was lack of accurate phone number. Patients contacted were slightly older (median 4 years) with no significant difference in provider impressions or vital signs. The most common reasons patients reported for not going to the ED on initial encounter were: felt reassured after the paramedic assessment (26%), medical complaint resolved (19%), paramedic suggested transport was not required (13%), concern for COVID-19 exposure (10%), and initial concern was not medical (8%). Ninety-five percent were satisfied with the non-transport decision and half had already sought follow-up care. The majority (86%) reported equal, improved or resolved symptoms, while 80 patients (13%) reported worse symptoms, of whom 80% remained satisfied with the non-transport decision. Of those whose symptoms worsened one-third re-contacted EMS and 59 (74%) sought some additional care. Overall, there were 154 of 3330 (4.6%) 9-1-1 recontacts within 72 hours. Based on coroner data, three unexpected deaths (0.09%) occurred within 72 hours of the initial EMS call.

Conclusions: Paramedic disposition according to ATR protocols during the COVID-19 pandemic resulted in a low rate of 9-1-1 recontact. Unexpected deaths were extremely rare. The large majority of patients reported symptom improvement and most of those who did not, sought additional care. Patient satisfaction with the non-transport decision was high.

No, authors do not have interests to disclose

87 A Low-Cost Simulator for Ultrasound-Guided Retrograde Endovascular Balloon Occlusion of the Aorta

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Study Objectives: Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) is a technique used for obtaining emergent control of life-threatening, non-compressible thoracic, abdominal, or pelvic hemorrhage (1). This abstract will detail a low-cost, ultrasound-realistic simulator for performance of the REBOA procedure. A major hurdle to widespread implementation of the REBOA technique has been the difficulty in obtaining adequate training analogues for development of competency among physicians (2). Currently, there is a paucity of literature and few commercially available simulators for REBOA training. Commercial simulation models for REBOA include high-fidelity simulators developed by Keller et al. (2), Prytime Medical (3), and Medalus (4). A low-cost, low-fidelity simulator has been proposed by Walsh et al. (5), however it lacks ultrasound compatibility.

Study Design/Methods: Performance of the REBOA procedure involves several steps. First, the provider must prepare a sterile field and cannulate the femoral artery with an introducer sheath under ultrasound guidance. The REBOA device is then passed through the introducer sheath to one of three target zones. Once positioned, the REBOA balloon is inflated until occlusion is achieved (1). Our simulator is constructed from a gelatin thigh analog with silicon tubing vessels connected to a clear plastic reusable simulated aorta. To create the gelatin thigh analog, two 30-cm sections of 0.5-in diameter silicon tubing are secured within an aluminum mold and embedded into a gelatin mixture. To create the gelatin, 50g of commercially available psyllium husk powder and 120g of gelatin powder (Commercial Knox Gelatin Powder(R)) are mixed in 1L of water and refrigerated for 12 hours prior to use. One of the two 0.5-in silicon tubing segments is connected to a 40-cm length of 1-in diameter rigid clear plastic tubing, which constitutes the aortic segment of the model. The aortic segment is then connected to a length of latex tubing with an in-line unidirectional manual pressure bulb to simulate pulsatile arterial flow. The other 0.5-in tubing segment is connected to an unpressurized reservoir to simulate non-pulsatile venous flow.

Results/Findings: To test the simulator, a 30-minute simulation session was conducted among 24 current emergency medicine resident physicians. Participants were asked to describe their knowledge of and confidence performing the REBOA procedure on a 1-to-5 Likert Scale before and after the simulation session. Confidence improved after the training, with a median confidence score of 1.0 before the session and 4.0 after the session. The results were evaluated using a Mann-Whitney U test which yielded a p-value <0.0001. Regarding cost, our model can be constructed for a total cost of $24. It is ultrasound compatible, provides life-like aortic pulsatility, and maintains anatomic functional accuracy.

Conclusion: This project details the construction of a low-cost, ultrasound-compatible simulator for training physicians in the REBOA procedure. Our simulation session and subsequent review of participant data demonstrate that such a simulation exercise yielded measurable benefits in procedural skills and medical knowledge for the participants.

No, authors do not have interests to disclose

88 Provider-Only Patients: A Novel Approach to Emergency Department Volume Surge and Covid-19

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Study Objectives: To address changes in the health care landscape precipitated by the Covid-19 pandemic, particularly the lack of health care personnel, the ED at Inova Health System developed a process to evaluate and treat patients under a Provider-Only Patients (POP) protocol involving only physicians or advanced practice providers (APPs).

Methods: In this study, the authors report on the development of the POP process and the outcomes of a cohort of patients with suspected Covid-19 who were seen in the ED as POP patients between December 1, 2021, and January 15, 2022. All POP patients had Covid-19–related complaints, had an Emergency Severity Index (ESI) of 4 or 5 (on a scale where 1 is most urgent and 5 is least urgent), required limited nursing intervention, were discharged, and were 21–64 years of age. Any patients who exhibited signs of hemodynamic instability (eg, hypo or hypertensive), had non–Covid-19 complaints, had room air oxygen saturation below 96%, were pregnant, had difficulty ambulating, and/or had inadequate social support were not considered to be a POP patient and were seen in the regular queue of patients. Inova developed a designated area in the ED where patients were seen and discharged directly by the provider. Patients were first triaged by a triage nurse or physician to determine POP status.

Results: As of January 2022, Inova's ED had seen 640 POP and 2,386 non-POP ESI 4 and 5 subjects (4.4% of the total ED census). Although the mean time from ED arrival to bed favored non-POP patients by approximately 9 minutes, the mean time from initially being seen by a provider to the discharge disposition and the mean time from discharge disposition placement to leaving the ED significantly favored POP by 48 minutes and 66 minutes, respectively. No POP patients returned within 72 hours for admission to the hospital. The authors estimate that the 640 patients who were part of the POP process saved approximately 1,892.27 nursing and 705.1 provider hours during that 46-day study period. No additional physician or APP hours were required.

Conclusion: The study supports the integrity of the POP care delivery process which suggests that POP is a safe, efficient, and effective process that can significantly reduce provider-to-disposition times and overall discharge length of stay. In addition to its value in mitigating the pandemic related staff shortage, the POP model may also be considered to address non-pandemic related staffing challenges.

No, authors do not have interests to disclose

89 A Qualitative Study of the Implementation of a California State Mandate on Discharge Processes for Patients Experiencing Homelessness

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Study Objectives: In recent decades, there has been a growing focus within health care practice and policy on addressing social determinants of health through promoting interventions such as screening, care coordination, and connection to social services for vulnerable patients, including patients experiencing homelessness (PEH). One promising policy in this domain is California Senate Bill 1152 (SB1152), a novel, unfunded state mandate that requires California hospitals to standardize hospital discharge planning in both emergency department (ED) and inpatient settings for PEH. Enacted in January 2019, it requires hospitals to screen patients for homelessness, offer PEH a range of resources and services, and log activities. This qualitative study describes: (1) participants' perceived scope and impacts of SB1152, and (2) key barriers and facilitators in implementing the law.

Methods: Through convenience sampling and a data use agreement with researchers from the Los Angeles (LA) County Department of Health Services, we conducted or accessed 32 semi-structured interviews across 16 general acute care

hospitals in Humboldt (N=4) and LA (N=12) Counties, which respectively had the highest per capita rate and number of people experiencing homelessness in the state in 2019. Interview participants included hospital administrators, mid-level managers, and front-line workers responsible for implementing SB1152-related protocols in ED and inpatient settings. Data were coded and synthesized into analytic memos informed by the five domains of the Consolidated Framework for Implementation Research: outer setting, inner setting, intervention characteristics, individuals involved, and implementation process.

Results: Participants noted various positive impacts with SB1152, citing that it helped systematize discharge planning for PEH by improving inter-professional accountability, streamlining processes, and increasing staff awareness of homelessness. However, participants also expressed concerns that the scope of the law did not address long-term needs of PEH. They also experienced many challenges to implementing SB1152, such as the lack of staffing and funding within the hospital, especially in rural hospitals and in EDs where time and resources were generally more limited. In addition to limited hospital resources, participants noted challenges with limited availability of community supports and insufficient state guidance during the process.

Conclusion: Overall, SB1152 was perceived as a necessary, albeit limited, step in standardizing social care-integrated discharge of PEH. The positive changes reported in the wake of SB1152 reflect potential benefits of similar legislation in other states and improvements in care for PEH. Furthermore, our findings on the implementation challenges highlight the importance of investments across systems of care, both within health care institutions and the community. Future policy efforts should mitigate the challenges experienced in California by providing social care staff funding, especially to rural hospitals; clear implementation guidance; expanded investment in community resources; and strengthened cross-sector care coordination.

No, authors do not have interests to disclose

90 Economic Impact: A Cluster Randomized Trial of a Rapid, High-Sensitivity Cardiac Troponin I Protocol

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Background: Economic data on the use of new rapid rule-out protocols using high sensitivity cardiac troponin I (hs-cTnI) for acute coronary syndrome (ACS) in the US is lacking. The RACE-IT stepped-wedge randomized controlled trial compared an accelerated hs-cTn protocol for evaluating ACS to standard of care (SoC) in 9 EDs serving Detroit, MI.

Study Objective: We investigated the economic impact of the RACE-IT protocol on cost of care and length of stay (LOS) for patients suspected and evaluated for ACS.

Methods: The trial took place from 7/2020 - 3/2021 in 9 EDs in an integrated health system serving Detroit, MI. The trial arms included a new 0/1-hour rapid protocol using hs-cTnI and SoC using a 0/3-hour protocol without hs-cTnI results. Randomization occurred by ED site. We included all adult ED patients for whom the treating clinician ordered an ECG and cardiac troponin. We excluded patients with STEMI, any hs-cTnI >18 ng/L in the ED, or a traumatic cause of symptoms. In the rapid protocol, MI was excluded, and ED discharge advised if hs-cTnI <4 ng/L at time 0, or =4 ng/L at time 0 with 1 hour <8 ng/L. For this analysis, the cost of care and length of stay for subjects enrolled in the rapid protocol was compared to SoC. Three measures were used for cost of care: total cost as estimated by the hospital, total payments received by hospital from insurance and patient, and total payment received from patient. The cost of care was considered for the initial visit, as well as at 30 days. The analysis adjusted for demographics, payer type (Medicare, Medicaid, commercial, other), and patient socioeconomic status as approximated by the first three digits of the zip code of the patient's residence.

Results: There were 32,609 patients, of whom 13,505 were in the standard care and 19,104 in the rapid protocol arms. The mean age was 59 years and 57.4% were female. Before adjustments, participants in the intervention arm had ED LoS 43 minutes longer than SoC, and hospital admissions that were approximately 0.14 days longer. The increase in LoS corresponds with an additional $500 cost incurred, on average, by patients in the intervention arm when compared to SoC patients. Patients in the intervention group paid an average of $251 more for the encounter. In the adjusted analysis, participants in the intervention group incurred modest increases in cost (+$64.06), greater hospital revenue (+286.71), and paid slightly less (-$12.48) when compared to patients in the SoC group. Adjusted analysis of length of stay demonstrated an increased ED LOS (+46.05 min) and hospital LOS (+0.11 days) for the intervention group compared to SoC. These results did not meet statistical significance.

Conclusion: Implementation of a rapid 0/1-hour hs-cTnI protocol to evaluate ACS in the ED was associated with modest increases in the cost of care and length of stay, but these differences did not reach statistical significance.

No, authors do not have interests to disclose

91 The Promising Use of an Emergency Department Observation Unit to Manage Patients With Opioid Use Disorder

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Introduction: The opioid epidemic has a major impact on emergency departments (EDs) nationally, resulting in patients presenting daily with opioid-related complications including intoxication, withdrawal, infections, injury, and death. Consequently, in recent years many EDs, including our own, have utilized Emergency Department Observation Units (EDOU) to treat patients with opioid withdrawal and overdose. This study aims to study the outcomes of patients with Opioid Use Disorder (OUD) who were placed in EDOU and started on buprenorphine as Medication for Opioid Use Disorder (MOUD).

Methods: This was a retrospective study of all patients who were placed in an EDOU with OUD in a single urban, tertiary care hospital from May to November 2021. Demographic data (age, race, insurance, housing, employment, and possession of phone) and factors related to the ED visit and EDOU stay (use of peer navigator services, buprenorphine dose and prescription, distribution of naloxone discharge kits, and addiction clinic referral) were analyzed. The primary outcome variables were complications after buprenorphine use (eg, precipitated withdrawal) and number of repeat ED visits and hospitalizations within 30 days for both all causes and opioid-related causes.

Results: 29 charts were identified, 58.6% were male, 41.4% were female, median age was 55 years, age interquartile range is 12 years, 93.1% of patients were insured, 65.5% had housing, none had employment, and 72.4% possessed a phone. While in the ED, 37.9% of the patients received peer navigator services, and 62.1% received buprenorphine. If given buprenorphine in the ED, average total dose was 13.55 mg, 88.9% of patients received individual doses between 8 – 16 mg, 11.1% of patients received individual doses less than 8 mg, and no patients had individual doses more than 16 mg. During the EDOU encounter, 48.3% of patients were given buprenorphine with a total course dose 19.14 mg with standard deviation 10.55 mg. Upon discharge from EDOU, 48.3% of patients were given buprenorphine prescription, 13.8% [AR1] [CS2] received a naloxone discharge kit, and 44.8% received an addiction clinic appointment. There were no patients with precipitated withdrawal after the first buprenorphine dose. There were no serious adverse events and no upgrades of hospital care to inpatient admission. 37.9% of patients had repeat ED visits for any cause, 27.6% had repeat ED visits for opioid-related complications, 6.9% had repeat admissions for any cause, and one patient had a repeat admission for an opioid-related complication within 30 days of discharge. There were no fatalities recorded within 30 days of EDOU discharge.

Conclusion: In this study, the EDOU presents as a promising location to provide quality care for patients presenting to the ED with complications from OUD with minimal adverse effects. Most patients who were treated with buprenorphine in the ED received individual doses of 8 mg or more, and none of these patients developed precipitated withdrawal. There were few repeat ED visits or hospitalizations from both all-causes and opioid-related causes within 30 days of discharge from the EDOU. Further non-observational studies regarding OUD management should be done to optimize care and improve clinical outcomes and health care utilization in patients with OUD.

Yes, authors have interests to disclose

Disclosure: Pfizer

Stockholder

Pfizer

92 Burn Injury Assessment Study: How Good Are We at Assessing Burn Injury?

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Background: Over 1 million burn injuries occur each year in the U.S. seeking evaluation in emergent or urgent care settings. A major component of the initial evaluation includes burn wound assessment (BWA). Unfortunately, historical studies have demonstrated that providers incorrectly assess the depth of burn wounds (BW) in 25- 30% of injuries, in part because BW evaluation has no adjunctive labs or imaging tools to aid in the determination of healing versus non-healing BW.

Study Objectives: The goal of our investigation was to study a diverse group of emergency medicine (EM) providers' assessments of BW to better discern baseline accuracy and practice patterns.

Methods: IRB-approved, prospective study designed to collect data from emergency department providers. Using a tablet- based data entry device, EM participants enrolling in the study completed a brief questionnaire followed by a series of five scenarios of thermal BW each with images from ABA-verified burn centers. 21-day follow-up photos of the BW were used to determine healing and non-healing regions by a consensus panel of fellowship-trained burn surgeons. EM participants were asked to mark the non-healing portions of the wound using a stylus. Results from the EM participants were compared to the 21-day healed/non-healed consensus panel to determine accuracy on a pixel-for-pixel basis. Statistical analysis of the non-healing portions of the wounds was performed by Chi square. Non-healing BW were defined as thermal burns of severity 3rd degree and deep 2nd degree. Healing burn were defined as thermal burns of severity 1st degree and superficial 2nd degree. Sensitivity was the percentage of "non-healing burn" areas that were marked. Specificity was the percentage of the "healing burn + uninjured skin" areas that were not marked. Accuracy was the percentage of area in a participant's image correctly marked by the participant.

Results: 77 participants enrolled in the study. 5 participants did not complete BWA drawings and were excluded. 360 images were reviewed in total for healing/non-healing BW. In the final cohort, 80% of the participants identified as emergency physicians in-practice (20% residents) with a median of 4 years in practice primarily at facilities not adjoined to a burn center (73%). For non-healing wounds, EM participants selected no surgery needed or local wound care only in 82% of the images. For healing wounds, participants correctly identified the wound as needing local wound care only in 34% of the images. Pixel-based mapping demonstrated a mean accuracy of 74%, sensitivity of 38%, and specificity of 77%.

Conclusions: This is the largest study to date examining emergency medicine providers ability to assess BW. This is important because in the event of a disaster, large numbers of burn casualties could overwhelm an already strained health care system and EM providers would be called upon to perform large volumes of BWA. Improvements in determining BW healing are essential to aid emergency department providers in the appropriate treatment of burn-injured patients.

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Yes, authors have interests to disclose

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Consultant/Advisor

Avita Medica, PolyNovo, Spectral MD, Access Pro Medical- in lieu of compensation all proceeds are donated to charities supporting burn outreach, education, survivor programs, and research.

Disclosure: Serves as the medical monitor for the Spectral MD DeepView Training Study

Consultant/Advisor

Serves as the medical monitor for the Spectral MD DeepView Training Study Disclosure: Spectral MD Inc

Employee Spectral MD Inc

93 Patients With Sickle Cell Disease Pain Crises Are Often Undertreated in the Out-of-Hospital Setting: A Multi-Agency Cohort Study

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Study Objectives: Although there is a growing body of literature examining racial/ethnic disparities in out-of-hospital pain management, there is limited data examining pain management for patients with Sickle Cell Disease (SSD). SSD is predominately prevalent in Black or African American patients, and often requires use of parenteral analgesia to manage acute pain crises. Our objective was to describe Emergency Medical Services (EMS) pain management practices for patients experiencing a SSD pain crisis.

Methods: For this retrospective cohort study, we used the 2021 ESO Data Collaborative, which consists of de-identified out-of-hospital records from 2,000 participating EMS agencies in the United States. We included all emergency responses for patients with EMS provider impressions indicating sickle cell pain crisis. We excluded interfacility transports and records for patients who were not alert during the encounter (Glasgow Coma Scale<14). When recorded by the EMS clinician, we categorized the initial out-of-hospital pain score as severe if a score >6 (on a 0-10 scale) was documented. Our primary outcome was administration of any analgesic agent by any route. Additionally, we described patient and encounter characteristics. Descriptive statistics were calculated (%, n). Patient contact time, defined as length of time from EMS arrival on scene until emergency department arrival, was compared between patients who received analgesia and those who did not using a chi-square test.

Results: We analyzed 3,997 EMS encounters from 355 agencies for alert patients with suspected SSD pain crises. The median age was 29 years (IQR: 24-37) and 54% (2164) were male. Most (97%, 3694) were Black or African-American (non-Hispanic). One-third (33%, 1326) received a response from a Basic Life Support (BLS) unit, whose providers traditionally do not have analgesia administration within their scope of practice. Among patients with a documented pain score (80%, 3215), the median first pain score was 8 (IQR: 6-10). Overall, 14% (549) of all patients with SSD pain received out-of-hospital analgesia. Fentanyl was the most common analgesic agent provided (68% - 375/549), followed by morphine (28% - 152/549). The proportion of patients who received analgesia increased to 20% (533) after excluding responses from BLS units. After limiting to patients with severe pain on initial assessment (>6), and who were cared for by an Advanced Life Support (ALS) unit, 32% (450) received analgesia. The median patient contact time among patients given analgesia was longer compared to those not given analgesia (36.2 vs. 25.0 minutes, $p<0.001$). However, more than half (51%, 339) of patients with severe pain attended by an ALS unit with a patient contact time >30 minutes did not receive analgesia.

Conclusion: One-in-five patients experiencing a SSD pain crisis did not have a out-of-hospital pain score documented. Overall, rates of EMS analgesia administration were low as only one-in-seven patients received analgesia. Even amongst patients with documented severe pain scores cared for by EMS providers capable of delivering parenteral analgesia, over two thirds did not receive analgesia. Furthermore, analgesia rates remained low despite prolonged patient contact time. Focused quality management initiatives to improve EMS pain assessment and treatment practices for patients with SSD pain are needed.

No, authors do not have interests to disclose

94 Adolescents' Suicide Rates by Ethnicity - Data from the National Vital Statistics System 2015-2020

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Background/Aim: Since the COVID-19 pandemic, emergency departments across the United States have seen an increase in patients seeking care for psychiatric complaints to include suicidal ideation and attempts. A recent national study reported that the suicide rate has decreased since 2018 but this decrease may not be equal across all age groups and ethnicities especially the younger aged. Using mortality data from the National Vital Statistics System (NVSS), we investigated the trends in the suicide death rate among those aged 10-19 by gender, ethnicity and mode of suicide between 2015-2020.

Methods: We identified individuals with intentional self-harm reported on death certificates as a leading cause of death or contributory cause of death from 2015-2020 using ICD-10 codes *U03,X60-X84,Y87.0. Annual percent change was calculated; ANOVA was used to determine differences.

Results: From 2015 to 2020, overall, there were 16,600 (12,310 males; 4,290 females) deaths from suicide among those aged 10-19; average age was 16.6± 2.1 males; 16.02± 2.22 females, 84% of males had some college; 77% females had some college; 99% were single in both groups. Non-Hispanic whites accounted for over 50% of all suicides followed by Hispanics at >20%. The number of deaths by suicide increased over time for males but decreased for females- both groups' age at death decreased over time. By ethnicity, both non-Hispanic black males and females saw a significant increase in their suicide rates from 10.3% (2015) to 12.3% (2020, P=0.03) males and 11.1% to 13.9% (P=0.05) females. Similar findings were noted for Hispanic males (13.3% to 18.3%, P=0.0001) and females (18.7% to 23.4%, P=0.006) while suicide rates decreased for non-Hispanic whites and Asians. The top three most frequent modes of suicide for females were hanging, strangulation and suffocation (>50%); discharge of firearms (>20%) and intentional self-poisoning by and exposure to drugs and other biological substances (>15%). The largest increase of over 250% was intentional self-poisoning (suicide) by and exposure to other and unspecified solid or liquid substances and their vapors. For males the top three most frequent methods used for suicide were discharge of firearms (>50%); hanging, strangulation and suffocation (>35%) and intentional self-poisoning by and exposure to drugs and other biological substances (>15%) while the largest increase (100%) was the same as for females- intentional self-poisoning (suicide) by and exposure to other and unspecified solid or liquid substances and their vapors.

Conclusion: Although suicide deaths have been reported to be decreasing, we found among those aged 10-19, suicide rates were increasing for both non-Hispanic blacks and Hispanic males and females but not for whites or Asians. The most vulnerable time may be when this age group starts college suggesting more support is needed for those transitioning from home for the first time. The large increase of 250% for females and 100% for males related to intentional self-poisoning and correlation with exposure and access to drugs and other biological substances requires further investigation as well. This includes evaluating the role of social media platforms particularly during the COVID-19 pandemic in promoting and facilitating access to drugs and biological substances.

No, authors do not have interests to disclose

95 A Tender-Loving-Care Volunteer Program to Provide Non-Clinical, Supportive Interventions to Older Adults in the Emergency Department

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Study Objective: To address the needs of an aging population in the acute care setting, ACEP's geriatric emergency department (ED) guidelines recommend developing age-appropriate care models. Cedars-Sinai ED developed and implemented The Tender-Loving-Care (TLC) volunteer program, a unique imitative that trains volunteers to provide non-clinical, supportive interventions to improve the ED care and experience for geriatric patients. Our research objective was to describe program implementation and characterize early findings about supportive interventions that TLC volunteers provide.

Methods: This was an observational study of the TLC volunteer program from January through April 2022 in a quaternary care academic medical center ED with an annual volume of 90,000 ED visits, 33% of which were for patients age 65+. Volunteers with previous ED experience received supplementary training from the hospital's Department of Volunteer Services, which included content from experts in nursing, social work, and physical therapy. Training topics included demographics of the aging population, common concerns of aging persons, how volunteers can support successful aging, and volunteer responsibilities in the Geriatric ED. Additional content included strategies to distinguish delirium and dementia; touch therapy; age-friendly communication; ageism; and body mechanics. After training, TLC volunteers circulated in the ED for 4-hour shifts between 7am and 10pm. TLC volunteers were asked to support patients age 65+ who were unaccompanied, had known cognitive disorders, had elevated fall risk, and/or had other needs identified by nursing staff. After each TLC encounter, volunteers completed an online data collection tool that documented their interventions including the patient's age, time of intervention, types of interventions provided, location of interaction, and free-response feedback from volunteers about the intervention given.

Results: During the first 4 months of the program implementation, 28 TLC volunteers provided approximately 1,000 hours of patient interactions and provided 215 interventions to 101 patients aged 65 to 99. The mean number of interventions per patient was 2.1, and TLC volunteers assisted an average of 2.3 patients per shift. Interventions provided by the volunteers in descending order included social and emotional support (n=77), assistance with nutrition/hydration (n=45), provision of personal care items (n=36), addressing safety concerns such as falls (n=15), assistance with orientation to location (n=13), assistance with dressing/undressing (n=8), discharge interventions (n=5) and walking buddy (n=2).

Conclusion: In this abstract, we describe a novel TLC volunteer program designed to provide non-clinical, supportive interventions for geriatric patients. We identified substantial opportunity to address needs of older adults in the ED such as social and emotional support, feeding, personal care, safety, orientation to their environment, and assistance with dressing and ambulation. Further research is needed to determine the program's impact on patient experience and clinical outcomes.

No, authors do not have interests to disclose

96 Using a Digital "Equity Dashboard" to Understand Language Disparities in Time to Pain Medication

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Study Objectives: Disparities in pain medication provision in the emergency department (ED) have been well documented. Previous studies have demonstrated inconsistent prescribing patterns in which racial minorities and patients with Limited English Proficiency (LEP) are undertreated for documented acute pain or at risk for delayed analgesia. This research has attempted to pinpoint a root cause, suggesting that provider bias contributes both to the determination of clinical acuity and choice of analgesia. The existing literature is limited in its discussion of practical interventions available to individual EDs to address this important challenge. This study explores the use of a digital "Equity Dashboard" to design a nimble, hypothesis-driven quality improvement initiative targeting delays in provision of pain medications in the ED at a large, academic, safety-net, level one trauma center. The objective of this study was to examine time to pain medication administration for patients presenting with a discharge diagnosis of "fracture," and further analyze these encounters by acuity and primary language.

Study Design: The Equity Dashboard is a digital platform that showcases key clinical and operational metrics based on real-time electronic medical record data. The tool filters outcomes by patient demographics, empowering clinicians with a dynamic reflection of care disparities. This study was grounded in the macroscopic observation from the Dashboard that LEP patients suffer from delays in pain medication administration. To explore this pattern, we conducted a retrospective review of all ED visits with a diagnosis of "fracture" from January 1 through December 31, 2021. We examined trends in time to analgesia for patients speaking the three most common primary languages (English, Spanish, and Cantonese). We defined a set of medications of interest: non-steroidal anti-inflammatories, acetaminophen, and opioids. We then conducted a linear regression – controlling for triage acuity – examining the impact of primary language on time to analgesia and its component steps: provider assignment, medication order, and medication administration.

Results: Overall, it takes an average of 180.6 minutes for patients to receive analgesia (Table 1). Closer examination demonstrates a consistent, though not statistically significant, trend in which Cantonese-speaking patients are delayed in receiving pain medications relative to their English- and Spanish-speaking counterparts. There was a statistically significant delay in providers placing analgesia orders for Cantonese-speaking patients. The other examined clinical process steps (provider assignment and order administration) were not significant contributors.

Discussion: The Equity Dashboard allows for dynamic review of clinical disparities and enables clinicians to rapidly design targeted interventions. In this examined case, prolonged time to provider order entry significantly contributes to an observed overall delay to pain medication for Cantonese-speaking patients. In response, our ED is examining pilot projects to facilitate interpreter access and link X-ray and analgesia orders. There are several limitations to this study, including the inherent imperfections of electronic medical record data. Despite this, it models the power of a digital platform to enable nimble equity-focused improvement initiatives.

TABLE 1		
Summary		
Total visits	1,445	
English	1,096	
Spanish	272	
Cantonese	77	
Overview: Time to analgesia		
	Mean (minutes)	*95% Confidence Interval*
Arrival to pain meds	180.6	167.7-193.5
Arrival to provider assigned	25.5	23.6-27.3
Provider assigned to medication order	56.1	51.3-60.9
Order to administration	99.6	87.5-111.8
Regression by language (Cantonese as reference)		
Arrival to pain meds		*P value*
Constant/intercept	238.8	-
English coefficient	-32.4	0.273
Spanish coefficient	-59.9	0.064
Arrival to provider assigned		*P value*
Constant/intercept	26.1	
English coefficient	0.07	0.97
Spanish coefficient	8.83	0.06
Provider assigned to medication order		*P value*
Constant/intercept	101.4	
English coefficient	-34.1	0.002*
Spanish coefficient	-41.0	0.001*
Order to administration		*P value*
Constant/intercept	111.8	
English coefficient	2.1	0.94
Spanish coefficient	-27.1	0.374

Yes, authors have interests to disclose
Disclosure: Fujifilm-SonoSite
Consultant/Advisor
Fujifilm-SonoSite

97 RESCUE TEE Simulation Training: Evaluating the Learning Curve, Competence and Skill Retention of Emergency Physicians Following a 6-Hour RESCUE-TEE Simulator-based Training Workshop

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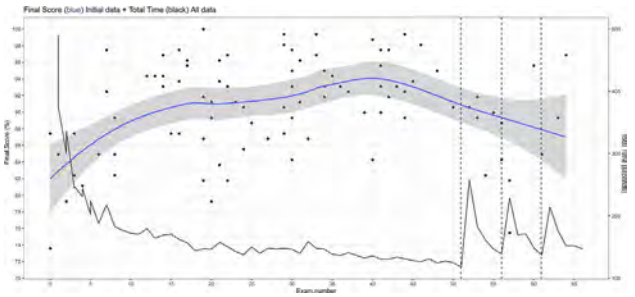
Study Objectives: Trans-esophageal echocardiography (TEE) is increasingly being used during cardiac arrest resuscitations. For Emergency medicine (EM) physicians, developing competency in this advanced procedure is difficult due to limited experience and exposure. Simulation training is ideally suited for this task and has proven useful for learning image acquisition. While there are reports of emergency physicians training in 4-view TEE exams, we suggest using an enhanced 12- view Rapid Evaluation in Shock and Cardiac Arrest Using Emergent (RESCUE) TEE exam due to its increased diagnostic capability. We aim to evaluate the effectiveness of a simulation workshop in developing and sustaining the image acquisition skills necessary for competency in the novel RESCUE TEE exam.

Study Design/Methods: We performed a prospective observational study of a simulation–based training program at an urban, university-affiliated, community hospital. Emergency physicians were recruited for a 6-hr RESCUE TEE simulation-based training workshop. The training began with a 1-hr introductory didactic session on RESCUE TEE followed by a hands-on session using the Simbionix Ultrasound Mentor. All participants underwent a baseline evaluation of image acquisition skills by performing 1 exam (12 images), followed by a series of 50 training exams (600 images). Board-certified cardiologists credentialed in TEE were included to represent the "gold standard" and establish standards for competency. "Skill competency" was defined as the ability to perform the RESCUE TEE exam with a comparable time and quality to the cardiology cohort. "Skill retention" was assessed at 1, 3 and 6-month intervals post-training. Studies were randomized and blinded for scoring by experienced Cardiac Anesthesiologists. Results of the univariate regression analyses are presented as means with 95% confidence intervals.

Results/Findings: 16 Emergency physicians were enrolled (5 EM residents, 5 EM ultrasound fellows, and 6 EM ultrasound-trained attendings) with 5 board-certified Cardiologists credentialed in TEE serving as the standard-setting group. 1,056 exams were completed resulting in 12,672 images captured, timed, and organized in sequence (pre-test through follow-ups). Emergency physicians at all levels showed rapid improvement in performing RESCUE TEE during training. A plateau in efficiency and quality of exams (see figure) was reached at approximately 25-30 repetitions with incremental improvement between exams 30-50. Results for efficiency showed exam completion in 150 seconds (135-160) and initial image quality scores reached 92% (90-94%) by this plateau. Skill retention appears to be well-retained based on the efficiency and quality of simulated exams performed up to 6 months post-training.

Conclusion: A 6-hour Simulator-based Training Workshop was effective in training physicians in the 12-view RESCUE TEE exam. The additional eight views of this exam were learned without difficulty and quality was maintained across all 12 views. Emergency physicians demonstrated competence at 25-30 exams and had marginal improvement between exams 30-50. This suggests that 25-30 exams may represent a reasonable number to develop competency in the novel RESCUE TEE exam.



No, authors do not have interests to disclose

98 Developing a Protocol for Medication Abortion in the Emergency Department: A Cross-sectional Survey of Emergency Physicians Regarding Providing Abortion Care

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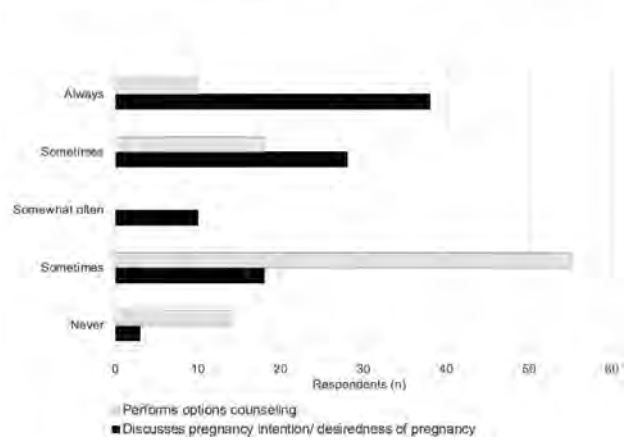
Study Objectives: As the Supreme Court is poised to overturn Roe v. Wade many states are rapidly passing restrictive legislation regarding if, when, and how a pregnant person can end a pregnancy. There is an urgent need to expand access to reproductive health care in all ambulatory health care settings. Prior to implementing a protocol for medication abortion in the emergency department (ED), we sought to explore emergency physician comfort with providing medication abortions. This study was conducted in collaboration with the Section of Complex Family Planning within the Department of Obstetrics and Gynecology in anticipation of developing a protocol for providing medication abortion to those patients who presented to the ED with a new diagnosis of unwanted pregnancy.

Study Design: We conducted a cross-sectional survey of academic emergency physicians (attendings, fellows, residents) at Stanford University exploring three constructs (familiarity with diagnosis, comfort with management, desire for additional training) of the five steps of abortion care: confirming pregnancy, disclosing diagnosis, exploring whether pregnancy was desired, options counseling, abortion provision, post-abortion complications. The study was approved by the Stanford University IRB and conducted in December 2021. Participants completed a piloted, electronic survey using Qualtrics Survey Software (Qualtrics International, Inc. Seattle WA). We used SAS OnDemand statistical software (SAS Institute Inc., Cary NC) to produce descriptive and chi-square statistics.

Results: A total of 97 emergency physicians completed the survey (response rate: 63.3%): 48 attendings, 10 fellows, 39 residents. Interest in providing abortion care was high: 60% of respondents were interested in performing medication abortions in the emergency department. Many physicians (85%) reported comfort in diagnosing and disclosing the new diagnosis of a pregnancy. More than half reported exploring if the pregnancy is desired with patients (always 39.2%, often 28.9%). 69% of respondents reported at least some familiarity with options counseling (somewhat familiar 53.6%, very familiar 15.5%) but fewer reported discussing options with the patient (always 10.3%, often 18.6%) [Figure 1]. Eighty percent desired additional training in options counseling: trainees were significantly more likely than attending physicians to express this interest (p=0.02). Self-reported gender identity (p=0.70) and age of respondent (p=0.17) were not associated with the interest in additional training. Familiarity with abortion complications varied (not familiar 14.4%, somewhat familiar 54.6%, very familiar 30.9%).

Conclusion: Emergency physicians want to provide abortion care in the ED and gain additional training to do so. This training includes how to counsel newly pregnant patients, including a greater understanding of all the options available to these patients.

Figure 1: **Emergency medicine physician reported frequency of discussing pregnancy desiredness and performing options counseling**



No, authors do not have interests to disclose

99 Who Reads Their Notes: Characteristics of Patients Viewing Notes in the Emergency Department Following an Open Notes Rollout

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Study Objectives: The 21st Century CURES Act requires health care organizations and clinicians to share clinical notes authored by providers with patients. The Open Notes project has existed for several years, with the goal of having patients read their clinical notes to empower themselves and increase shared decision making between patients and clinicians. Emergency medicine literature regarding Open Notes is limited but emerging. We retrospectively collected six months of patient data from the electronic health record beginning in May 2021 at UC San Diego Health on emergency department patients, following our Open Notes rollout. We aim to describe the patient characteristics to understand which patients are reviewing their clinical notes.

Methods: We performed a query in the UC San Diego Health emergency departments from May 1, 2021 to October 31, 2021 to obtain patient note metadata regarding note signed status, notes shared, sensitive notes blocked, note view times, note date, MyChart status (active vs inactive), assigned sex at birth, author type, author service, patient ID, note ID. We performed basic statistical analysis utilizing Microsoft Excel.

Results: A total of 42343 notes were signed on 23441 unique patients. There were 798/42343 (2%) total notes blocked. 11965/23441 (51%) were female, 11457/23441 were male (49%), and 19/23441 were unknown. The total number of unique patients with active MyChart status was 12757 with the following breakdown: 7459/12757 (58%) female, 5294/12757 (42%) male, 4/12757 unknown. Of the 42343 notes signed in the ED, 22326 notes were signed for patients with active MyChart accounts. 418/22326 (2%) of these notes were blocked from the patient by the author. Out of the group with an active MyChart, 6532/21908 (30%) non- blocked notes were viewed, which we will further discuss as "viewable notes." Of these 12871/21908 (59%) were written for female patients, 9032/21908 (41%) were written for male patients, 5/21908 were unknown. 4088/12871 (31%) of notes written for female patients were read. 2443/9032 (27%) of notes were written for male patients were read. There were 10101 notes written by an attending physician out of 21908 (46%) and 3213/10101 (32%) of these notes were viewed. 9800/21908 (45%) were written by a trainee (resident physician or fellow) and 2738/9800 (30%) notes were viewed. 1990/21908 (9%) were written by a midlevel (nurse practitioner or physician assistant) and 574/1990 (29%) notes were viewed.

Conclusion: 30% of viewable notes in patients with active MyChart accounts were viewed by the patient. Both the total notes blocked and notes blocked for patients with active MyChart accounts were approximately 2%, suggesting that the MyChart active status does not affect note sharing habits by the provider. Most of the notes available to view for active account holders were written by physicians; however, about a third of patients viewed their notes for each group: attending physician, resident/fellow, and midlevel. Our future areas of exploration with respect to our Open Note rollout include note block reason, living arrangement, patient gender identity, sexual orientation, ethnic background, race, and spoken language.

No, authors do not have interests to disclose

100 A Hybrid Management System for Pandemic Success: Application of the Incident Command and Lean Management Systems in San Francisco's Covid Response

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Background: Early in the Covid-19 pandemic, public health and health care operational leaders recognized the need for a sustainable management system that met pressing needs not fully addressed in the Incident Command System model. Together with emergency management partners, the San Francisco Unified Command leadership built a unique hybrid system that joined the clarity of ICS to the process-improvement strength of Lean Management. This management system used data to drive improvement, aligned a fast-growing organization to proactive strategic objectives, and built a decision-making process that enabled disaster service workers to solve problems efficiently and effectively.

Study Objective: This presentation will describe the design process and key principles used to develop and improve the hybrid management system implemented by the San Francisco Unified Command Covid Response.

Design: Key principles of the hybrid management system include the following: (1) Alignment of operational objectives to strategic and value-based objectives to enact a sustained response; (2) Enhance critical decision- making through a process that includes data review and root-cause analysis; (3) Respect and support people (both public and community responders) through real-time information sharing, resource mobilization, feedback and coaching. A daily, tiered reporting structure was implemented that utilized real-time data and coaching strategies to develop leaders and operators throughout all levels of the incident command response. The hybrid management system principles and techniques were applied to interdisciplinary teams participating in medical operations, testing, outbreak response, isolation and quarantine program design, as well as vaccine and therapeutics program implementation. Outcomes: San Francisco is the 2nd most densely populated city in the country and has experienced fewer COVID-19 related deaths per capita than any comparable city (93.24 per 100,000 compared to US death rate of 300 per 100,000). Additionally, San Francisco has achieved one of the highest vaccination rates world- wide, with a full- vaccination rate of 84% among the whole population, including over 90% among those over 65 years of age, across all rave and ethnicities, as well as 76% among all Black/ African American residents, 86% among Asian residents, and over 89% among Latina/o/x residents, compared to nationwide rates of 57%, 85% and 65%, respectively for the same time period.

Conclusion: A hybrid management system using the strengths of both the incident command and lean management systems can be applied to long-term, volatile and evolving disaster management scenarios, as demonstrated by their application in the San Francisco response to the Covid-19 Pandemic. Other public health and health care delivery systems could cross-train in these techniques as part of preparedness efforts.

No, authors do not have interests to disclose

101 Differentiating Type 1 from Type 2 Acute Myocardial Infarction in the Emergency Department Using the N-terminal Pro B-type Natriuretic Peptide/High-sensitivity Cardiac Troponin T Ratio

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Study Objectives: Acute myocardial infarction (AMI) is currently further diagnosed as being a type 1 (T1), caused by coronary artery atherosclerosis with thrombosis or a type 2 (T2), resulting from cardiac oxygen supply and demand imbalance. It is hypothesized that patients with T2 might develop earlier and increased cardiac wall stressing before the development of AMI as compared to those with T1, resulting in higher N- terminal pro B-type natriuretic peptide (NT-proBNP)/high sensitivity cardiac troponin T (hs-cTnT) ratios. Our objective was to determine the differences in NT-proBNP/hs-cTnT ratios measured in emergency department (ED) patients enrolled in a multi-center hs-cTnT trial and having an adjudicated T1 or T2 AMI.

Study Design Methods: This study was a pre-planned subgroup analysis of the STOP-CP (High Sensitivity Cardiac Troponin T to Optimize Chest Pain Risk Stratification) trial, which prospectively enrolled patients ($\geq$ 21 years) presenting to the ED (8 medical centers in the United States) with symptoms suspicious for AMI (1/25/2017-9/6/2018). Patients had study blood samples drawn at baseline ($<$ 1 hour from the troponin draw ordered by the treating physician), 1, 2 and 3 hours later with NT-proBNP and hs-cTnT (Roche, Basel, Switzerland) values determined at a central lab. Subjects were independently adjudicated as having a T1 or T2 AMI using all available clinical information during the 30 days after the ED visit. Receiver Operator Curves (ROC) were plotted for the 4 blood samples with optimal cut points (OCP) determined for the NT- proBNP/hs-cTnT ratios for differentiating a T1 from a T2 AMI along with the sensitivities and specificities (confidence intervals) of these values in predicting a T2 AMI diagnosis.

Results/Findings: Of the 1462 enrolled patients 172 (11.8 %) had an AMI with 67 (39.0 %) being a T1 and 105 (61.0%) a T2. Clinical characteristics (age, sex, African American race), medical history (hypertension, diabetes, coronary artery disease, AMI) and ECG findings (normal or with ischemic changes) and presenting symptoms (chest pain, arm/shoulder discomfort, lightheaded) were not different (all $p > .05$) in patients with T1 or T2 AMIs. The median NT-proBNP/hs-cTnT ratios were higher in T2 as compared to T1 AMI at baseline, 1, 2 and 3 hours: 5.3 v 27.5, 4.4 v 28.0, 3.5 v 29.4 and 5.1 v 30.0 (all $p < .0001$) respectively. The OCP for NT-proBNP/hs-cTnT ratios to differentiate T1 from a T2 AMI at each timepoint were 6.9, 3.3, 14.0 and 13.1. The sensitivities of these values for the diagnosis of a T2 AMI were 75.2, 86.1, 68.5 and 69.0 and the specificities 59.7, 47.0, 70.5 and 65.5 respectively.

Conclusion: The NT-proBNP/hs-cTnT ratio values at all ED blood draws for patients having symptoms suspicious for AMI were higher in those with a T2 as compared to T1 AMI. However, the cut points determined at each time point for AMI type differentiation were associated with sensitivities and specificities that would be inadequate for routine clinical diagnostic use. Further analyses of our results to determine alternative NT-proBNP/hs-cTnT ratio cut points with improved specificity for T2 AMI are ongoing.

Yes, authors have interests to disclose

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The STOP-CP multicenter study was funded by Roche Diagnostics

102 Prediction of Elevated Intracranial Pressure Using Quantitative Electroencephalogram in a Porcine Experimental Traumatic Brain Injury Model

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Objectives: Traumatic brain injury (TBI) is a significant global health burden and estimating intracranial pressure (ICP) is crucial for treatment. The purpose of this experimental study is to develop the electroencephalogram (EEG) based prediction model for elevated ICP.

Methods: Traumatic brain injury experimental model for 30 pigs were designed and conducted. Study protocol aims to collect single-channel EEG data every 6 minutes in 10mmHg increments in the ICP range from baseline to 50mmHg. EEG were processed to extract representative 10 EEG indexes, which were compared according to ICP elevation. We derived the prediction model to predict the Increased ICP (over 25mmHg) using four different machine learning algorithms, including the logistic regression (LR), Naive Bayes(NB), Support Vector Machine (SVM), Random Forest (RF). We assessed the performance of each model by accuracy, sensitivity, and specificity with 95% confidence intervals (CIs) and area under the receiver operating characteristic curves (AUC).

Results: 5 EEG indexes (Magnitude of EEG, LOGENERGYEN, SD alpha, SD beta, SD gamma) tend to be increased according to ICP elevation and two EEG indexes (DELTAR, DTABR) showed U-shape and inverse U-shape. The accuracy of prediction model with SVM algorithms was highest among all models; 0.773 (95% CI 0.694 - 0.853) for SVM, 0.749 (95% CI 0.658 - 0.840) for NB, 0.746 (95% CI 0.673 - 0.818) for RF, and 0.706 (95% CI 0.625 - 0.787) for LR. The AUC of each model was 0.860 (95% CI 0.781 - 0.938) for SVM, 0.824 (95% CI 0.740 - 0.907) for NB, 0.802 (95% CI 0.710 - 0.894) for RF, and 0.748 (95% CI 0.644 - 0.851) for LR.

Conclusion: We developed the prediction model for elevated ICP using single-channel EEG signals during traumatic brain injury. The highest AUC of the model is 0.860, suggesting that EEG should be considered in the field of developing monitoring methods for traumatic brain injury.

Characteristics of electroencephalography parameters in derivation group according to elevated intracranial pressure

		ICP <20mmHg	ICP 20~30mmHg	ICP 30~40mmHg	ICP 40~50mmHg	ICP ≥50mmHg	
Variables		Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	p-value
Mean arterial pressure, mmHg		90.2 (12.2)	91.6 (19.6)	101.1 (21.6)	98.2 (24.4)	120.1 (11.2)	<0.001
Heartrate, rate/min		96.1 (16.9)	103.2 (19.6)	104.9 (20.4)	114.8 (30.4)	134.8 (52.0)	<0.001
EEG Indexes	Magnitude of EEG	32.51 (17.14)	33.54 (15.44)	37.49 (18.20)	37.68 (17.44)	41.51 (9.83)	<0.001
	DELTAR	-0.81 (0.31)	-0.72 (0.42)	-0.87 (0.40)	-0.92 (0.33)	-0.39 (0.37)	<0.001
	DTABR	0.78 (0.29)	0.70 (0.36)	0.83 (0.35)	0.86 (0.30)	0.39 (0.33)	<0.001
	THETAPR	0.14 (0.05)	0.14 (0.05)	0.12 (0.05)	0.11 (0.05)	0.08 (0.02)	<0.001
	GAMMAPR	0.02 (0.01)	0.02 (0.01)	0.02 (0.01)	0.02 (0.02)	0.07 (0.01)	<0.001
	LOGENERGYEN	1,811.04 (475.04)	1,833.23 (455.48)	1,994.28 (508.89)	2,008.83 (470.69)	1,743.32 (282.71)	<0.001
	SD_theta	4.22 (2.56)	4.24 (2.27)	4.59 (2.62)	4.28 (2.39)	3.12 (1.18)	<0.001
	SD_alpha	2.95 (1.70)	3.14 (1.58)	3.21 (1.65)	3.06 (1.57)	3.52 (0.99)	<0.001
	SD_beta	3.19 (2.06)	3.29 (1.52)	3.41 (1.66)	3.46 (1.72)	8.10 (2.18)	<0.001
	SD_gamma	1.47 (0.90)	1.57 (0.82)	1.68 (0.95)	1.81 (0.99)	2.81 (0.63)	<0.001

ICP, intracranial pressure; SD, standard deviation; EEG, electroencephalography

No, authors do not have interests to disclose

103 Level 4 and Level 5 Emergency Department Fees in Florida Vary Widely

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Background: Emergency department (ED) visits are billed using a 5-level system with level 1 visits being the least complex and level 5 visits being the most complex. The majority of ED visits are billed as level 4 or level 5. Data from over 10 years ago showed that there was substantial variation in these fees from hospital-to- hospital. Given the new price transparency rule enforced by the Centers for Medicare & Medicaid Services (CMS), we felt that a reassessment of ED visit fees was warranted. We thus sought to determine the level 4 and level 5 ED visit fees for all hospitals in Florida and explore the relationship between these fees and hospital characteristics.

Methods: This was a cross-sectional analysis of hospitals in the hospitals in Florida listed on CMS' Care Compare Web site. We excluded military and psychiatric hospitals from the analysis. Next, we utilized the American Hospital Association directory to obtain the following data for each hospital: hospital type (acute care, critical access, or pediatric), teaching status, trauma center status, number of staffed beds, type of control (for-profit, governmental, church, or other nonprofit), and hospital system. Finally, we searched each hospital's Web site for their publicly available chargemaster. We searched each chargemaster file for the standard charges for ED level 4 and 5 visit fees. With that data, we determined the median ED visit fees and associated interquartile range for hospitals in Florida. Finally, we performed multivariate linear regression to determine which hospital characteristics are associated with higher ED visit fees.

Results: On October 12, 2021, there were 216 hospitals in Florida listed on CMS' Care Compare Web site. We excluded 18 psychiatric hospitals and 8 military hospitals. The chargemaster file was not accessible for two hospitals. This left 178 hospitals for

analysis. The median level 4 fee was $2243.50 (IQR: 1670.30- 3504.70), with a minimum of $276.10 and a maximum of $14067.50. The median level 5 fee was $3251.00 (IQR: 2243.50-4836.20), with a minimum of $401.90 and a maximum of $17526.00. Table 1 demonstrates the median ED visit fees stratified by hospital characteristics. On multivariate analysis, ED visit fees remained lower for governmental hospitals and higher for for-profit hospitals.

Conclusion: Despite price transparency rules, level 4 and level 5 ED visit fees vary widely from hospital-to-hospital. In particular, governmental hospitals charge less and for-profit hospitals charge more. Future analysis should be conducted to determine what other differences in medical care systems may contribute to these varying charges.

Table 1: Median gross charges for level 4 and level 5 visits.*

Hospital Characteristic	Level 4 Visit Charge	Level 5 Visit Charge
Hospital Type		
Acute care (n = 166)	2448 (1718-3612)	3256 (2371-4893)
Critical access (n = 9)	1091 (700-1548)	1598 (935-2013)
Pediatric (n = 3)	2244 (2134-2298)	3581 (3171-3959)
Teaching Status		
Academic (n = 63)	2517 (1834-3676)	3701 (2552-5509)
Not academic (n = 115)	2075 (1584-3358)	3219 (2191-4502)
Trauma Status		
Trauma center (n = 35)	2682 (1964-4016)	3510 (2721-5698)
Not a trauma center (n = 143)	2223 (1629-3430)	3251 (2228-4628)
Staffed Beds		
<100 (n = 37)	1835 (885-2500)	2427 (1560-3327)
100-499 (n = 119)	2517 (1828-3813)	3647 (2598-4919)
≥500 (n = 22)	2149 (1852-2738)	3167 (2436-4214)
Type of Control		
For-profit (n = 76)	3733 (2706-4925)	4691 (3605-6923)
Government (n = 24)	1338 (963-1834)	1829 (1148-2680)
Church (n = 13)	2223 (2024-2448)	3327 (3131-4191)
Other nonprofit (n = 65)	2024 (1548-2244)	2762 (2050-3251)
System		
HCA# (n = 42)	4164 (3052-5150)	5213 (4183-8403)
AdventHealth (n = 18)	2124 (1646-2411)	3631 (2851-4191)
Trinity Health (n = 8)	2053 (2027-2053)	3251 (3217-3251)
Baptist Health South Florida (n = 8)	1548 (1548-1548)	2013 (2013-2013)
TENET Healthcare (n = 5)	13189 (12945-14051)	15759 (15359-16159)

*Data are reported as median (interquartile range).
#Healthcare Corporation of America

No, authors do not have interests to disclose

104 Emergency Department Implementation of a Two Bag Diabetic Ketoacidosis Protocol Decreases Time to Resolution: A Retrospective Single Center Analysis

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Objective: Diabetic ketoacidosis (DKA) is a serious, acute complication of both type 1 and type 2 diabetes requiring prompt management. In an attempt to improve adherence to American Diabetes Association's guidelines for DKA, the emergency department (ED) led a hospital-wide transition to a two bag protocol on August 3, 2021. The two bag protocol is designed to keep fluid rate, electrolyte administration, and insulin infusions constant while delivering a titratable amount of dextrose by changing the relative rates of two fluid bags. After implementation of the two bag protocol, we evaluated the effect on management of DKA patients who started their care in the ED.

Methods: We performed a before-and-after retrospective cohort comparison of adult patients with DKA who presented to our ED between January 1, 2021, and February 28, 2022. Aside from the education about the new two bag protocol, there were no other additional education or operational interventions during this time. Patients were excluded if they were transferred after the administration of insulin. The primary outcome was time to anion gap closure. We additionally evaluated time to beta-hydroxybutyrate normalization, length of hospitalization, time to transition to subcutaneous insulin, and number of patients with hypoglycemic events.

Results: Fifty six patients with DKA were included for analysis during this timeframe. Twenty three were managed with a traditional protocol and thirty three were managed using the new two bag method. Baseline demographics were similar between the two groups. Mean time to anion gap closure was shorter in the two bag cohort (12.6 vs 15.3 hours; $p = 0.05$). Similarly, mean time to beta-hydroxybutyrate normalization was also reduced in the two bag group (14.4 vs 30.7 hours; $p = 0.03$). Hospital median length of stay was 5 days in the traditional cohort and 3 days in the two bag cohort ($p=0.141$). Time to transition to subcutaneous insulin was 42.3 hours in the traditional cohort and 26.8 hours in the two bag cohort ($p=0.064$). Three patients in the traditional cohort had a hypoglycemic event (mean blood glucose during event 63), and six patients in the two bag cohort had a hypoglycemic event (mean blood glucose during event 67).

Conclusion: Implementation of a two bag DKA protocol in the ED was associated with a shorter time to anion gap closure without significant impact on time to subcutaneous insulin transition.

No, authors do not have interests to disclose

105 Mortality of Trauma Patients With COVID-19

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Background: COVID-19 has infected millions of Americans and resulted in nearly one million deaths in the United States alone over the last few years. COVID-19 infection leads to respiratory and other organ system failure and has had a significant impact on various populations, especially those with comorbidities. Studies have demonstrated worse outcomes in COVID-19 infected patients undergoing surgical procedures and in certain types of trauma. However, many of these studies have been performed in urban areas, which may not be generalizable to more rural settings. Some studies evaluated mortality in trauma patients with an isolated injuries or included patients with various atraumatic surgical pathologies. Whether COVID-19 infections are associated with increased mortality in suburban/rural populations who present to the emergency department as trauma patients remains unknown.

The goal of this study was to determine if COVID-19 infection is associated with increased mortality and hospital length of stay in trauma patients presenting to a Level I Trauma Center serving a rural catchment area.

Methods: This was a retrospective cohort study of adult patients admitted to our institution for a traumatic injury. All adult trauma patients admitted between April 2020 and March 2021 and entered in our institution trauma registry were included in the study. Trauma patients less than 18 years old and those admitted for a burn injury were excluded. Demographics, mechanism of injury, injury severity scores (ISS), COVID-19 positivity hospital length of stay (LOS), and in-hospital mortality were retrieved from the trauma registry. The association between COVID-19 positivity, LOS, in-hospital mortality and other covariates were measured using propensity score matching at a 6:1 ratio and regression analysis. $P < 0.05$ was considered significant.

Results: A total of 2049 trauma patients were identified; 3.4% (69) were COVID-19 positive. Patients were matched based on age, BMI, race, mechanism of injury, and ISS. A total of 465 patients were included in the analysis; 80% were White, 67% were male with a median age of 54. Average number of days spent at the hospital was longer for trauma patients with COVID-19 (adjusted beta coefficient 0.70, 95% CI, (0.39-1.02), $p \leq 0.0001$). COVID-19 positive trauma patients were 7 times more likely to die in the hospital than COVID- 19 negative trauma patients (adjusted odds ratio 7.0, 95% CI, (2.48 – 19.79), $p \leq 0.0001$).

Conclusion: Rates of in-hospital mortality was higher and length of hospital stay was longer for COVID-19 positive trauma patients when compared to COVID-19 negative trauma patients. Future studies are warranted to determine patient specific risk factors that predict COVID-19-related mortality. Such studies would provide valuable insights into the care of at-risk trauma patients, thereby supporting providers' decision processes.

No, authors do not have interests to disclose

106 Lipid Emulsion Therapy During Resuscitation of the Critically-Ill Poisoned Patient: A Prospective Cohort Study

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Background: Intravenous lipid emulsion (ILE) has emerged as a potential antidote for treatment of intoxication by lipophilic drugs. Despite conflicting pre-clinical (animal) data, its use continues to expand. The "lipid sink" theory, which is the

prevailing theory on ILE mechanism of action, suggests that ILE generates a flux of drugs from the periphery into the vascular compartment, thereby reducing the target organ exposure and toxicity of lipophilic drugs. The primary aim of this pragmatic, real-life prospective cohort study was to compare efficacy (measured by patient survival to hospital discharge) of ILE during resuscitation of critically-ill poisoned patients intoxicated by xenobiotics with wide spectrum of lipophilicities (determined by the octanol water partition coefficient (Log P). A secondary aim was to assess if ILE therapy is associated with an increase in blood pressure of included patients.

Methods: In 2010, the American College of Medical Toxicology established a prospective registry of all consecutive patients managed at the bedside by participating medical toxicologists. The registry currently includes approximately 50 medical centers in the United States and 3 international centers. In 2012 a dedicated sub-registry, which prospectively captures all poisoned patients who receive ILE as part of their resuscitation was created. All cases were prospectively collected and entered into the lipid subregistry from May 1, 2012 through December, 2018. For each patient encounter, the registry collects detailed information on demographics, exposure circumstances, clinical course, management, disposition, and outcome. The primary outcome was to determine survival after ILE therapy. A secondary outcome involved stratifying survival based on the intoxicant's octanol water partition coefficient (Log P). In addition, the study also assessed the association between drug lipophilicity and increase in blood pressure after ILE administration.

Results: We identified 134 patients who met inclusion criteria. Of these patients, 81 (60.4%) were female. The median (IQR) age was 40 (21-75) years, with a range of 1 month to 79 years. 108 (80.6%) patients survived, with 45 (33.6%) experiencing a cardiac arrest during their intoxication. 82 (61.2%) were hypotensive, and 98 (73.1%) received mechanical ventilation. There was no relationship observed between survival and the log-P of the intoxicating substance on linear analysis ($p=0.89$), or polynomial model ($p=0.10$). The median (IQR) systolic blood pressure in those with log $P < 3.6$ was 68 (60-78) mmHg before ILE, and 89 (76-104) mmHg after ILE; $p=0.002$. In those poisoned by a drug with log $P > 3.6$, the median (IQR) systolic blood pressure before ILE was 69 (60-84) mmHg vs. 89 (80-96) mmHg after ILE; $p=0.0003$. The improvement in systolic blood pressure was not significantly different in patients intoxicated by a drug with a lower log P than those with a higher log P.

Conclusions: Among critically-ill patients treated with ILE by medical toxicologists, survival was common, but not associated with lipophilicity of the intoxicant. ILE therapy was associated with increase in systolic blood pressure in poisoned patients, irrespective of drug lipophilicity. The results question the lipid sink theory of ILE.

Log P	Dead	Alive	Survival (N), (%)
<2.6	5	28	(28/33) 84.8
2.6-3.6	7	23	(23/30) 76.7
3.6-4.2	10	27	(27/37) 72.9
>4.2	4	30	(30/34) 88.2

No, authors do not have interests to disclose

107 Systematic Review of Ionizing Radiation Dose Exposure for Commonly Performed Chest Imaging Techniques in the Emergency Department Setting

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Objective: The frequency of radiological imaging use in the emergency department (ED) has increased nationwide. Diagnostic radiological imaging techniques used in the ED pose a long-term health threat to patients caused by ionizing radiation exposure. We aim to create a comprehensive estimate of the radiation dose exposure associated with various radiological imaging types of the chest in an ED setting.

Methods: We performed a systematic review and meta-analysis following PRISMA guidelines. With the help of a librarian, we created a search in PubMed and EMBASE to identify original research and systematic review/meta-analysis papers that reported radiation doses for commonly ordered chest imaging studies. We screened for papers published since the year 2000 that included at least 20 patients of all demographics and concerned primary radiation exposure to human patients. All articles were independently screened through titles and abstracts by two raters, and all discordant ratings were reviewed by a third rater. We then performed screening of the full text of included papers to ensure that sufficient details based on study type and detail were provided. We extracted data using a standardized form to capture publication information, imaging specifics, number of subjects, patient characteristics, and effective radiation dose. We synthesized the data using meta-analytic techniques.

Results: The effective dose administered by chest imaging types in the ED ranged from as low as 0.026 mSv (in a lateral view chest x-ray) to as high as 40.8 mSv (in a CT coronary angiogram). Generally, CT Coronary Angiograms expose patients to the highest effective dose of radiation (0.33 - 40.8 mSv), followed by CT Chest Angiograms (0.64 - 20 mSv), standard Chest CTs (1.23 - 12.54 mSv), and Chest X-Rays (0.026 - 0.99 mSv). Within the large range of effective dose administration in each group, a correlation was observed with variants in imaging protocols including gating standards, slice number, dual vs. single source CTs, x-ray views, and patient demographics and anthropometrics.

Conclusion: We provide estimates of radiation exposure for commonly ordered chest imaging in the ED which consider specific variables in imaging protocol and patient characteristics. Our next step is to complete systematic reviews and meta-analyses for other body regions and for the risk of malignant transformation to provide a comprehensive review to allow ED physicians to make better informed decisions when ordering diagnostic evaluation imaging and to better counsel patients on the risks of harm with such evaluations.

Type of Imaging	# of Articles	# of Subjects: Total Mean Range Pediatrics	Effective Radiation Dose (mSv): Mean (SD) Range Pediatrics Mean
Chest X-Ray	4	743 185 22-457 295	0.11 (0.21) 0.026 - 0.99 0.07
Chest CT	18	4195 233 30-1458 260	5.40 (4.69) 1.23 - 12.54 8.7
Chest CT Angiogram	12	3,122 260 42-896 47	12.79 (6.9) 0.64 - 20 0.64
Coronary CT Angiogram	15	5,915 394 50-2298 63	14.36 (11.56) 0.33 - 40.8 0.48

Table 1: Summary of article number, subject number, and effective radiation dose collected from our search for papers concerning radiation dose in emergency medicine chest imaging studies.

No, authors do not have interests to disclose

108 Characteristics of Emergency Medical Treatment and Labor Act Citations and Their Association With Patient Death

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Study Objectives: The Emergency Medical Treatment and Labor Act (EMTALA) was enacted in 1968 in response to reports of inadequate, delayed, or denied treatments of patients due to their insurance status, or lack thereof. EMTALA establishes a duty for hospitals to evaluate all patients who present to the emergency department by providing a medical screening examination as well as stabilizing treatment if an emergent condition is identified, and transfer if patient had an emergent medical condition requiring specialized stabilizing services unavailable at the initial hospital (eg neurosurgery for an epidural hematoma). The Centers for Medicare & Medicaid Services (CMS) is responsible for EMTALA enforcement. Prior work demonstrated that EMTALA violations are relatively common. However, patient-level outcomes from EMTALA citation events have not been previously reported. The objective of this study was to identify and describe the incidence, characteristics of, and trends in EMTALA citation events involving patient deaths.

Methods: This observational study examined the trends in the characteristics of EMTALA citation events associated with patient death. Descriptions of all EMTALA citation events from January to September of 2021 were obtained from CMS. The data

set included facility location and deficiency type(s) identified in the EMTALA citation along with a free-text summary describing findings of the investigation including descriptions of clinical cases, and typically outcomes. EMTALA citation event summaries were systematically reviewed for references to patient death. When deaths were identified, the location cause, and circumstances of death were systematically extracted and coded. The occurrence of deaths and non-deaths were analyzed against characteristics such as region, and deficiency tag to identify significant trends.

Results: Of 115 EMTALA citation events during the 9-month study period, 12 (10.4%) involved patients who died. Among the 12 involving patient deaths, 7 (58%) were cited for deficiencies related to EMTALA policies and procedures, 6 (50) for failure to provide appropriate medical screening exam, and 4 (33%) for failing to provide stabilizing services, and 4(33%) for failing to restrict transfer until stabilized, though proportion of deficiency types did not differ between events associated with deaths and events not associated with deaths. Of citation events associated with deaths, 8 (66%) occurred in CMS Region 4 (AL, FL, GA, KY, MS, NC, SC, TN) compared to 40% of those that did not. Three (24%) of 12 EMTALA citation events associated with death occurred in CMS Region VII (IA,KS,MO,NE) compared with 7% of those that did not (-18.1 p.p. difference, CI -35.1, -1.1). Of note, outcomes for patients for some citation events were not clearly described, and in one case, a patient pending medical clearance for a psychiatric facility wandered off and has yet to be found, suggesting reported numbers may represent an underestimate of citation events involving deaths.

Conclusion: One in ten EMTALA citations events are associated with patient death (10.43%). A substantial proportion of EMTALA citation events involving deaths occur in two CMS regions, which could indicate the need for more education regarding EMTALA compliance in those regions, as well as further investigation into whether these findings reflect regional variation in quality of care or in EMTALA enforcement activities.

No, authors do not have interests to disclose

109 The Impact of the Patient Role on Medical Student Learning During Peer Simulation

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Objectives: Simulation-based learning has been found to be an effective approach to teaching and assessing medical students. Peer simulation is one modality, where students can be taught to portray the patient role, while a peer takes on the physician role. Despite evidence for the effectiveness of peer simulation as a teaching modality in health professions education, there is a lack of research regarding how playing the patient role during peer simulation impacts medical student learning. The objective of our study, was to explore the experiences of first-year medical students playing the patient role during a high-fidelity, out-of-hospital medical simulation.

Methods: We utilized a qualitative phenomenological design to explore the patient experiences of the first-year medical students. We analyzed 175 reflection papers written by the students at the conclusion of the peer simulation using the phenomenological data analysis process: epoche, horizontalization, and phenomenological reduction. The first step, epoche, involved engaging in self-reflection to bracket our biases. The next step was horizontalization, in which each member of the research team read through the reflection papers, making notes (codes) of significant words or phrases. In the final step, phenomenological reduction, we came to a consensus on how to categorize these codes into themes. We then defined each of these themes, which served as the results of our study.

Results: Four themes emerged from the data: 1) communication 2) empathy 3) stress, and 4) professional identity development [Table 1]. The first-year students learned the importance of team, patient, and non-verbal communication, especially during transitions of care. Next, they recognized the importance of quality patient care and prioritizing the humanity of their future patients. The students also connected stress and mistakes, instilling in them the importance of stress management. Finally, the students expressed a commitment to continued professional development as they were inspired by their peers to see their future selves.

Conclusion: Our study's results reveal the value of the patient role during peer simulation for medical student learning, especially early in their training. Observing health care delivery from the patient perspective is an effective strategy for teaching essential communication competencies and encouraging reflection on individual professional identity formation. Our utilization of first-year students as patients during peer simulation serves as a model to inform development of future peer simulation curricula in medical education.

Table 1. Themes and Subthemes from a Patient Experience Peer Simulation

Theme	Subtheme	Representative Quotes
Communication	Team Communication	Composure and communication go a long way…This highlighted for me that if there's no communication, there's no care
	Patient Communication	I believe that the experience will translate to real word treatment of patients and allow me to make the effort to engage with future patients in a meaningful way
	Non-Verbal Communication	I'm really glad I was able to be a patient in this experience because I think it will help me be a better provider for someone
	Transitions of Care	The handoffs were often the make-or-break in terms of whether critical patients "made it" or not
Empathy	Patient Experience	Role-playing a patient helped me understand the extent of vulnerability and helplessness that real patients face
	Patient Care and Outcomes	The experience emphasized how important it is to be an empathetic physician
	Patient Humanity	One of the other lessons from my patient experience that will shape my future care of patients is to remember to care for the patient as a person; that making them feel like you see and care for them as a person is part of good healthcare
Stress	Stress Leads to Mistakes	One of the main things that I have learned … is that stress can make bad decisions even worse…a high stress environment can make all that information and knowledge magically disappear
	Importance of Stress Management	I noticed that providers who listened and were able to breathe and slow down the chaos provided better care
Professional Identity	Inspired by Fourth-Year Medical Students	No matter how unprepared I feel right now, I have the ability and opportunity to get to where the fourth years are now
	Increased Medical Knowledge	I was able to learn something new even when I was just being a patient
	Seeing Future Self	Every day of the patient experience further solidified my image of the doctor I want to become
	Commitment to Professional Development	This experience inspired me to study and work hard in medical school so that … I am confident in my ability to perform under pressure and provide the necessary care in an effective manner.

No, authors do not have interests to disclose

110 Pulmonary Embolism and Cancer – Can the PERC Rule Still Apply?

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Study Objectives: Pulmonary Embolism (PE) in cancer is a controversial topic, with experts in several fields at odds regarding prophylactic anticoagulation, predictive models, and risk stratification. The Wells and Geneva Scores both include cancer as a high risk condition, though alone, cancer does not place an individual in the high risk category. The Pulmonary Embolism Rule-out Criteria (PERC score) is an accepted decision rule for use in the emergency department (ED) on low-risk patients. Our objective was to evaluate the performance of the PERC rule when applied retrospectively to a cohort of ED patients who were ultimately diagnosed with PE.

Methods: We queried the electronic medical record at 2 academic EDs in Southern California between 6/01/12 and 6/01/19 to identify patients with active cancer who were diagnosed with a PE. We collected demographics, as well as vital signs, past medical history, cancer history and elements of the PERC score including heart rate, oxygen saturation, presence of hemoptysis, estrogen use, surgical history, prior PE/DVT, and unilateral leg swelling. Descriptive statistics are reported.

Results: We identified 202 patients who met our inclusion criteria. Our cohort was 51% female and predominantly white (59% White, 18.3% Hispanic, 6.4% Black, 7.9% Asian) with a median age of 60. Lung cancer was the most common malignancy (15.8%, n=32), followed by breast (10.4%, 21), pancreatic (10.4%, 21), colorectal (9.9%, 20) and head/neck (9.4%, 19). Approximately 60% of patients were considered metastatic. Among our cohort, only 7 patients were considered low risk and were PERC negative. This represents a sensitivity of 96.5%. However, only one of these patients presented with a chief complaint concerning for PE (shortness of breath). All other PEs were detected incidentally on imaging. None of these patients required admission.

Conclusion: Our results suggest that the PERC score remains highly sensitive, even in a population of cancer patients considered at increased risk for PE. Even in the small group of patients with PE who were PERC negative, only one patient had suspicious symptoms. None of these PERC "failures" represented a clinically significant PE. Further, prospective studies are needed to evaluate whether the PERC rule may be safely used to screen for PE in patients with cancer.

No, authors do not have interests to disclose

EMF

111 Exploration of Uncertainty Scale Use in Patients With Potential Acute Coronary Syndrome

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Study Objectives: Patients seeking care in the emergency department (ED) identify fear related to ongoing symptoms and uncertainty about symptom significance as common drivers of the decision to seek care. These findings resulted in development of the Uncertainty Scale (U-Scale) to quantify patient uncertainty related to symptoms during an acute care encounter. In prior work, psychometric testing of the 30-item U-Scale demonstrated content validity, high internal consistency, reliability, and evidence for concurrent validity. The primary goal of this project is to assess whether U-Scale scores change over the course of a hospital stay in patients presenting to the ED with symptoms concerning for acute coronary syndrome. Additional goals include exploration of the extent to which U-Scale scores change over the course of patients' hospital stays and the impact of factors such as additional testing or cardiology consultation have on changes in U-Scale scores.

Study Design/Methods: This is a prospective observational cohort study in which we enrolled patients age $\geq$40 years who presented to the ED with symptoms concerning for acute coronary syndrome (eg, chest pain, shortness of breath, dizziness), had a troponin order placed by the treating physician, and were able and willing to provide informed consent. Subjects complete surveys at two time points. The first (baseline) survey is completed during ED triage, prior to communication of any results of ED work-up. The second survey is completed at the time of ED disposition, after patients have received results of their ED work-up. Surveys include the 30-item U-Scale and the six-item short-form of the State Trait Anxiety Index (STAI). U-Scale responses to the 30-item questionnaire are scored 30-150, with higher scores indicating greater uncertainty. Target enrollment is 150 subjects, allowing for 90% power to detect a mean total U-Scale score change from baseline of at least 5 points.

Results: In the preliminary cohort, there were 39 subjects enrolled with average age of 64 years, 62% female (n = 24), and a median HEART score of three. Thirty-two subjects completed the baseline and ED disposition surveys, of whom three (9%) were admitted to the hospital, six (19%) were admitted to the observation unit, and 22 (69%) were discharged from the ED. The average U-Scale score decreased from 78.6 (SD 17.3) for baseline surveys to 71.0 (SD 17.9) for ED disposition surveys ($p = 0.002$).

Conclusion: In this preliminary cohort of patients, we documented a significant reduction in U-Scale scores over the course of ED stay for patients with symptoms concerning for acute coronary syndrome. While these results are preliminary, they suggest that U-Scale scores may have utility in documenting the impact of various acute care interventions (eg education, testing, consults) on patient uncertainty. Final study findings will provide valuable insight into the utility of the U-Scale as an outcome measure for interventions focused on improving patient-centered communication and other care processes, while also providing important data regarding levels of uncertainty among patients presenting to the ED with symptoms concerning for acute coronary syndrome.

No, authors do not have interests to disclose

112 Future Uses of Telesimulation: National Survey of Emergency Medicine Residency Simulation Directors

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Study Objective: The COVID-19 pandemic accelerated the need for virtual learning opportunities including telesimulation. Many Emergency medicine (EM) simulation directors were forced to halt their in-person simulation curriculum and adapt to telesimulation, but specifics on their utilization practices and plans for future use is unknown. We sought to describe the patterns of telesimulation usage in recent times and its anticipated utility in medical education moving forward.

Methods: We developed a confidential, Web-based survey after literature review, using survey research best practices. The survey consisted of multiple choice and free response items pertaining to use of telesimulation before, during, and after in-person learning restrictions due to COVID-19. The survey was piloted prior to use and disseminated to emergency medicine simulation directors in January-February 2022. Programs were identified via the EMRA Match Web site and simulation director's contact information was obtained via the residency program's Web site if available. When not available on the Web site, contact information was obtained by emailing the program coordinator and/or program director.

Results: Contact information was obtained for 139 residency simulation directors. Survey response rate was 68% (94/139), with 3 participants opting out of the survey, leaving 91 responses. Seventy percent of respondents were from PGY 1-3 programs and 30% from PGY 1-4 programs. During in-person learning restrictions, 62% (56/91) of programs used some form of telesimulation. Assuming all in-person education restrictions lifted, 38% (34/90) of respondents plan to use telesimulation in some capacity in their curricula, compared to 9% (8/91) who reported they were using telesimulation prior to the pandemic. Most who plan to use telesimulation in the future plan to integrate it with their in-person simulation curricula, using telesimulation for 25% of the time of less (30/34), with only few planning to use telesimulation for more than 25% of their simulation curriculum (4/34). While many different types of simulation cases and activities were trialed using telesimulation, the majority of survey respondents that plan to continue using telesimulation plan to use it for medical knowledge (76%, 26/34) and communication/teamwork focused cases (68%, 23/34), rather than for procedure focused cases (21%, 7/34) or dedicated procedure training (15%, 5/34).

Conclusion: Despite relatively low use of telesimulation in emergency medicine residencies prior to the COVID-19 pandemic, experience using telesimulation during the pandemic has led to an increased number of residency programs who plan to incorporate it into their simulation curricula. This plan for continued use opens opportunities for further innovation and scholarship within this area of simulation education.

Table: Survey Results

EM residency program use of telesimulation	
Prior to COVID-19 pandemic	9% Yes (8/91) 91% No (83/91)
During in-person learning restrictions	62% Yes (56/91) 38% No (35/91)
Planned use after in-person restrictions lifted	38% Yes (34/90) 62% No (56/90)
Percent of future simulation curriculum involving telesimulation for those who plan to continue using telesimulation	
1-25% of the time	88% (30/34)
26-50% of the time	9% (3/34)
51-75% of the time	3% (1/34)
76-100% of the time	0% (0/34)
Types of future telesimulation activities for those who plan to continue using telesimulation	
Medical knowledge focused cases	76% (26/34)
Communication/teamwork focused cases	68% (23/34)
Procedure focused cases	21% (7/34)
Dedicated procedure training	15% (5/34)

No, authors do not have interests to disclose

113 A Novel Video Laryngoscope Device (IVOS Boss G4) for Minimizing Aspiration Events

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Study Objective: Airway secretions and massive emesis during video guided intubation can limit visibility and compromise the health of a patient. We developed a new device, the IVOS Boss G4, for video assisted laryngoscope intubation that decreases aspiration risks by means of built-in suction and air flow. To test this claim, we compared the speed and efficacy of intubation of our device vs. current methods under simulated aspiration conditions.

Methods: This prospective study evaluated Certified Registered Nurse Anesthetists (n=9) performing video assisted laryngoscope intubation under two conditions with

two different devices: unsoiled and soiled manikin airways with both the IVOS Boss G4 alone and a standard commercial video laryngoscope (Glidescope VL4, Verathon) with Yankauer wand suction. Vomiting was simulated for the soiled airway using a motorized pump and a standardized concoction of water thickener and oatmeal. The primary outcome was speed of intubation by recording the total time to successful endotracheal intubation. The volume of emesis entering the lungs in soiled conditions was measured as a secondary outcome.

Results: Under soiled conditions, the average total time for successful intubation using the standard commercial video laryngoscope and Yankauer was 100.14 seconds (SD=38.60), while the IVOS Boss was 49.92 seconds (SD=23.06). There was a statistically significant difference found in the average intubation time using a two-tailed t-test with $p<0.01$. Aspirate volume in the lungs was significantly lower with the IVOS Boss G4 ($p<0.05$). The IVOS Boss G4 had an average of 58.33mL (SD=50.99) whereas the commercial video laryngoscope with Yankauer suction averaged 96.67mL (SD=21.65).

Conclusion: The IVOS Boss G4 video laryngoscope device allowed for faster intubation with less aspirate entering the lungs when compared to the Glidescope VL4 with Yankauer suctioning. The increased speed and efficiency of the IVOS Boss may help decrease the volume of pulmonary aspirate, amount of time without a protected airway and provide better patient outcomes. Future directions include prospective studies with larger sample populations and assessment of clinicians with differing levels of intubation experience.

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114 Validation and Comparison of Triage-Based Screening Strategies for Sepsis

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Objectives: Prompt treatment of sepsis requires rapid identification and diagnosis, a tough proposition given the syndrome's frequently subtle presentation and the busy emergency department (ED) environment. This study aims to validate and compare the discrimination of published models for patients with potential sepsis at ED triage.

Methods: We performed a case/control study of 2,000 adult patients who presented to one of four emergency departments in Utah in 2018, including 1000 patients who met Sepsis-3 criteria (IV or equivalent antibiotics, body fluid culture, and Sequential Organ Failure Assessment score $\geq$2 points above baseline) while in the ED and 1000 patients who did not. Trauma patients were excluded. Sepsis case patients who did not have infection suspected in ED based on structured chart review (ie, received antibiotics for an indication other than acute infection, eg prophylaxis) were reassigned as controls. Nine previously- published triage, warning, or early sepsis prediction scores and systemic inflammatory response syndrome (SIRS) criteria were calculated using first-available ED data. Scores' discrimination for detection of patients meeting Sepsis-3 criteria in the ED was measured by the area under the receiver operator curve (AUROC). All potential scores were tested for equivalent performance jointly and in pairwise comparisons matching SIRS against each other compared with a joint test against the alternative scores using pairwise comparisons.

Results: Sepsis-3 criteria were met for 3,319 (2.4%) of 140,371 adult ED patients in 2018. Among the 2,000 case/control patients, the average age was 56 (SD 21) years, 856 (43%) had no infection, 305 (15%) had pneumonia/pulmonary infection, 332 (17%) had urinary tract infection and 507 (25%) had other or unknown sources of infection. Patients without sepsis were younger (51$\pm$21 versus 62$\pm$19 years), had fewer comorbidities (weighted Elixhauser comorbidity score median 7 [IQR 0-18] vs 18 [IQR 8-30]), and had significantly more abnormal vital signs. Compared to SIRS (AUROC 0.78, 95% CI 0.76-0.80), both version #3 of the Predict Sepsis score (AUROC 0.86, 95% CI 0.84-0.87) and the Screening to Enhance Prehospital Identification of Sepsis (SEPSIS) scores (0.82, 95% CI 0.80-0.84) scores displayed improved discrimination compared to the SIRS score ($p<0.001$ for both comparisons, Figure 1). At their recommended cutoff values, the sensitivity of SIRS criteria (69%) was similar to Predict Sepsis (67%) but higher than SEPSIS (12%). Specificity of both Predict Sepsis (90%) and SEPSIS (99%) was higher than SIRS (77%), however, with positive predictive values of 14.2%, 26.3%, and 6.8% respectively. Discrimination of the Quick Sequential Organ Failure Assessment (qSOFA, AUROC 0.69, 95% CI 0.67-0.71) was lower than SIRS ($p<0.001$).

Conclusion: Compared to SIRS, the Predict Sepsis and SEPSIS risk scores exhibited significantly improved discrimination with increased specificity and positive predictive values, though the SEPSIS score had low sensitivity. qSOFA underperformed SIRS and had very low sensitivity. Our findings emphasize the importance of external validation of sepsis risk assessment tools.

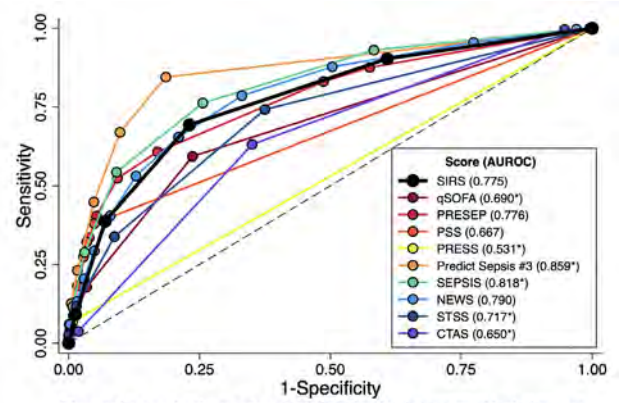

Figure: Area under the receiver operator characteristic curve of tested scores. * - p<0.001 for comparison vs SIRS. All other comparisons p>0.05.

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Disclosure: Asahi Kasei Pharma (payment to institution)
Investigator
Asahi Kasei Pharma (payment to institution)

115 A Novel Order Set Driven Emergency Department Atrial Fibrillation Algorithm Drives Compliance With Risk-Appropriate Thromboembolic Prophylaxis and Increases the Frequency of Discharge to Home

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Study Objectives: Patients with atrial fibrillation (AF) are frequently admitted from the emergency department (ED). Further, discharged patients are not reliably prescribed risk appropriate anticoagulation. We assessed the impact of a novel computerized ED AF pathway order set on discharge rate and risk appropriate anticoagulation in patients with a primary diagnosis of AF.

Methods: The order set included options for rate and rhythm control of primary AF, structured risk assessment for thrombotic complications, recommendations for anticoagulation as appropriate, and follow up with an electrophysiologist. All patients discharged from the ED in whom the AF order set was utilized over an 18-month period comprised the primary study population. The primary outcome was the proportion of patients appropriately anticoagulated according to confirmed CHADS-VASC and HASBLED scores. Additionally, the percentage of primary AF patients discharged directly from the ED was compared in the 18- month periods before and after introduction of the order set.

Results: 394 patients were seen in the ED with a primary diagnosis of AF during the 18 months after implementation of the order set, of which 160 were discharged. Of those discharged, the order set pathway was utilized in 56 (35%) patients. These 56

patients comprised the main study population and were included in the primary analysis. The average age was 57.8 years and average initial heart rate 126 beats/minute. Prescribed thrombotic prophylaxis was guideline-concordant in all 56 (100%; 95% confidence interval = 94% to 100%). Anticoagulation was prescribed (or continued) in 26 (46%) patients, antiplatelets in 21 (38%), and 9 patients (16%) were discharged without any anti-thrombotic or anticoagulant medication. Discharge rates in the pre- and post- order set implementation periods were 29% and 41%, respectively (95% confidence interval for 12% difference = 5% to 18%).

Conclusions: Our novel AF pathway order set was associated with 100% guideline concordant anticoagulation in patients discharged from the ED. Availability of the order set was associated with a significant increase in the proportion of ED AF patients discharged. Our data suggests that structured risk- factor stratification and symptom control for patients with AF can be easily achieved in the ED. Pathways that promote standardized best practices and encourage appropriate access to outpatient care have the potential to streamline emergency care and safely limit costly inpatient resource utilization. This pilot study was conducted at a single urban quaternary referral academic medical center, future work to explore the generalizability and robustness of our results is needed across ED types and health systems.

No, authors do not have interests to disclose

116 Diagnostic Accuracy of Neuroimaging in Emergency Department Patients With Acute Vertigo or Dizziness: A Systematic Review and Meta-analysis Supporting the Guidelines for Reasonable and Appropriate Care in Emergency Medicine

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Background: Patients presenting to the emergency department (ED) with acute vertigo or dizziness represent a diagnostic challenge. Neuroimaging has variable indications and yield. We aimed to conduct a systematic review and meta-analysis of the diagnostic test accuracy of neuroimaging for patients presenting with acute vertigo or dizziness.

Methods: An electronic search was designed following patient-intervention-control-outcome (PICO) question, (P) adult patients with acute vertigo or dizziness presenting to the ED; (I) Neuroimaging including Computed tomography (CT), CT Angiogram (CTA), Magnetic Resonance Imaging (MRI), Magnetic Resonance Angiogram (MRA), and Ultrasound (US); (C) MRI/clinical gold standard; (O) central (ischemic stroke, hemorrhage, tumor, others) versus peripheral cause of symptoms. Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) was used to assess certainty of evidence in pooled estimates.

Results: We included studies that reported diagnostic test accuracy. Articles were assessed in duplicated. From 6,309 titles, 460 articles were retrieved, and 12 met the inclusion criteria. Non-contrast CT scan: 6 studies, 771 patients, pooled sensitivity of 28.5% (95% CI 14.4-48.5%, moderate certainty) and specificity of 98.9% (95% CI 93.4-99.8%, moderate certainty). MRI: 5 studies, 943 patients, pooled sensitivity of 80.9% (95% CI 71.7-87.6%, high certainty) and specificity 100.0% (95% CI 100%, high certainty). CTA: 1 study, 153 patients, sensitivity 14.3% (95% CI 1.8-42.8%) and specificity 97.7% (95% CI 93.8- 99.6%). CT and CTA were compared, with CT having a higher sensitivity than CTA (21.4% and 14.3%, respectively) for finding a central etiology of presenting symptoms. MRA: 1 study, 24 patients, sensitivity 60.0% (26.2-87.8%) and specificity 92.9% (66.1-99.8%). US: 3 studies, 258 patients, sensitivity ranged from 30-53.6%, specificity from 94.9-100%.

Conclusion: Non-contrast CT has very low sensitivity and MRI will miss approximately one in five patients with stroke if imaging is obtained early after symptom onset (which is often the case in the ED). Neuroimaging should not be used as the only tool for ruling out stroke and other central causes in patients with acute dizziness or vertigo presenting to the ED.

No, authors do not have interests to disclose

117 Impact of Air Pollutants on Deep Learning Forecasting of Emergency Department Patient Arrivals

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Study Objectives: Understanding the arrival patterns of emergency department (ED) patients is fundamental for allocating limited health care resources, and climate factors are known to increase ED visits. The objective of this study was to develop a forecasting model based on ED patients' arrival, air pollutants, and climate factors to facilitate data-driven resource planning.

Methods: We performed a cohort study of patients presenting to an urban, academic ED that cares for a largely Black population between January 1, 2021 to December 31, 2021. Data comprised daily ED patient arrivals, demographic information, climatic variables (ie, temperature), and air pollutants defined by the U.S. Environmental Protection Agency (EPA), which include the particle concentration data (PM10) and gaseous pollutant (mainly CO, ozone, SO2). We used Spearman correlation to assess the relationship between the time-series variables. We developed Long Short-Term Memory (LSTM) deep learning models to forecast patient arrivals that we divided into respiratory and non-respiratory illnesses. The models integrated climatic and air pollutant variables as independent variables. The data was split into training (90%) and testing (10%) sets to develop and evaluate the performance of the models, respectively. Model assessment included root mean squared error (RMSE), defined as the square root of the average of the squared error between predicted and actual ED patient arrival rates per day, and the mean absolute percentage error (MAPE), defined as the average of the absolute percentage errors. Smaller RMSE and MAPE values indicate more accurate forecasting.

Results: There were 83,539 total ED patient arrivals (6,741 diagnosed with respiratory illnesses) with a mean age of 47.9 $\pm$ 18.7 years. A majority were female (42,735, 51.2%), and 60,137 (72.0%) were Black. The average patient arrival per day was 18.5 (SD 10.8) for patients diagnosed with respiratory illness and 210.4 (SD 28.2) for patients with non-respiratory illness. The Spearman correlation showed that only ozone ($r = -0.12$) and temperature ($r = -0.42$) had a negative correlation that was statistically significant ($p < 0.05$) for ED arrivals respiratory illnesses. For non-respiratory illness ED arrivals, CO ($r = 0.16$), PM10 ($r = 0.25$), ozone ($r = 0.42$), SO2 ($r = 0.20$), and temperature ($r = 0.59$) had statistically significant ($p < 0.05$) positive correlation. We used these significant variables to develop the forecasting model. Figure 1 shows the observed and predicted ED patients' arrival for respiratory and non-respiratory illnesses. The LSTM model predicts the test data (ie, the hold-out data) for respiratory and non-respiratory illnesses with RMSE scores of 13.6 and 26.9 patients, respectively. The MAPE values imply that the average deviation between the forecasted and actual ED patient arrivals for respiratory and non-respiratory illnesses was 33.7% and 14.2%, respectively, regardless of whether the deviation was positive or negative.

Conclusion: This data demonstrates the impact of climate, air pollutants, and gaseous emissions on forecasting respiratory and non-respiratory-related ED visits. Our study provides evidence of correlations between exposure to air pollution, gaseous emissions, and ED visits.

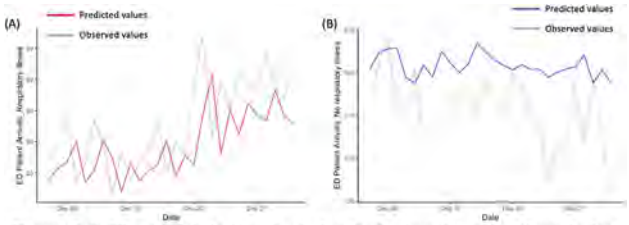

Figure 1: Daily ED patient arrivals: (a) predicted values closely mirrors the test data (observed values) for patients diagnosed with respiratory illness, and (b) predicted values struggle to learn the pattern in the test data for patients with non-respiratory illness. Note that, the reason for the non-optimal model performance is due to insufficient sample sizes that falls into the diverse and heterogeneous types of non-respiratory illnesses.

No, authors do not have interests to disclose

118 Wilderness Medicine Curricula in Non-Physician Training Programs

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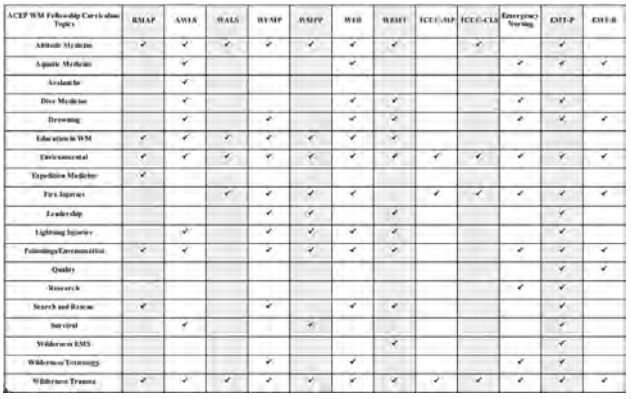
Study Objectives: The objective of this study was to analyze and demonstrate the similarities and differences among non-physician training programs regarding the WM components in their respective curricula. These non-physician training programs vary vastly in their goals, perspectives, and scopes of practice and include Emergency

Medical Technician-Basic (EMT-B), Emergency Medical Technician-Paramedic (EMT-P), Emergency Nursing, Tactical Combat Casualty Care – Combat Lifesaver Course (TCCC-CLS), Tactical Combat Casualty Care – Medical Personnel (TCCC-MP). Wilderness Emergency Medical Technician (WEMT), Wilderness First Responder (WFR), Wilderness Medicine for Professional Practitioners (WMPP), Wilderness Upgrade for Medical Professionals (WUMP), Wilderness Advanced Life Support (WALS), Advanced Wilderness Life Support (AWLS), and Remote Medicine for Advanced Providers (RMAP).

Study Design/Methods: Nineteen WM components were listed from the ACEP WM Fellowship curriculum created by the ACEP Wilderness Medicine Section Fellowship Subcommittee and Taskforce for WMS- certified WM programs. The curricula for EMT-B, EMT-P, Emergency Nursing, TCCC-CLS, TCCC-MP, WEMT, WFR, WMPP, WUMP, WALS, AWLS, and RMAP were analyzed for their WM components using the ACEP WM Fellowship curriculum as a control. Descriptive analysis was used to determine similarities and differences between each program and the ACEP WM Fellowship curriculum.

Results/Findings: The ACEP WM Fellowship curriculum components included: Education of Wilderness Medicine, Quality, Research, Leadership, Altitude, Environmental, Wilderness Trauma, Expedition Medicine, Drowning, Dive Medicine, Aquatic Medicine, Poisonings and Envenomation, Fire, Wilderness EMS, Search and Rescue, Survival, Lightning, Avalanche, and Wilderness Toxicology. Table 1 demonstrates the WM components in each of the non-physician training programs analyzed. The EMT-P program curriculum covers the most WM topics (16[84%]), whereas TCCC-CLS covers the least WM topics (3 [16%]).

Conclusion: In one of the first of its kind, this study analyzed the curricula of non-physician training programs, including EMT-B, EMT-P, Emergency Nursing, TCCC-CLS, TCCC-MP, WEMT, WFR, WMPP, WUMP, WALS, AWLS, and RMAP, for their WM components. The results show that each program covers WM components to different extents. These similarities and differences reflect the varying and unique goals and perspectives of each program. These results can demonstrate an opportunity for these non-physician training programs to expand their WM curriculum within their scope of practice



No, authors do not have interests to disclose

119 Cannabis-induced Anxiety Disorder in the Emergency Department

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Study Objective: In December 2018, Michigan became the 10th state to legalize marijuana for adults. Since this law took effect, increased availability and use of cannabis in Michigan have led to an increase in emergency department (ED) visits associated with the drug's psychiatric effects. Our purpose was to describe the prevalence, clinical features, and disposition of cannabis-induced anxiety disorder in a community-based study.

Methods: This was a retrospective cohort analysis of consecutive patients diagnosed with toxicity related to cannabis use. Patients were seen at seven emergency departments (EDs) over a 24-month study period (November 2018-October 2020). Spanning 13 counties in Michigan, affiliated institutions included three rural medical centers, three university-affiliated hospitals and a children's tertiary care facility. Data collected included demographics, clinical features, and treatment outcomes in patients presenting to the ED with a chief complaint of anxiety. This group will be compared to a cohort experiencing other forms of cannabis toxicity. Chi-squared and t-tests were used to compare these two groups across key demographic and outcome variables. One investigator performed a blinded critical review of a random sample of 10% of the charts to determine inter-rater reliability using kappa statistics.

Results: During the study period, 1135 patients were evaluated for cannabis toxicity. A total of 196 patients (17.3%) had a chief complaint of anxiety and 939 (82.7%) experienced other forms of cannabis toxicity, predominantly symptoms of intoxication or cannabis hyperemesis syndrome. Patients with anxiety symptoms had panic attacks (11.7%), aggression or manic behavior (9.2%), hallucinations (6.1%), depression (4.6%), and suicidal ideation (3.1%). Many of these patients (64.8%) had associated cardiopulmonary complaints, such as tachycardia, dyspnea, hypertension, and chest discomfort. Cannabis edibles were the most common products to cause anxiety symptoms in all age groups. Compared to patients presenting with other forms of cannabis toxicity, those with anxiety were more likely to younger (25.2 vs 28.5 years, $p<0.001$), have psychiatric comorbidities (18.9 vs 10.5%, $p=0.001$) and had a history of polysubstance abuse (20.4 vs 14.7%, $p=0.04$). Patients with cannabis-induced anxiety had a shorter ED length of stay (2.4 vs 3.0 hours, $p=0.01$) but a similar rate of hospital admissions (8.7 vs 9.3%, $p=0.79$). Reliability of data collection ($k = 0.87$) showed excellent agreement.

Conclusions: Cannabis-induced anxiety disorder is common after acute or chronic cannabis exposures, occurring in 17% of ED patients in this community-based study. This disorder is associated with cardiopulmonary complaints and aggressive behavioral disorders. These troublesome findings highlight the risks associated with the use of cannabis for recreational or therapeutic purposes. ED clinicians must be adept in the recognition, evaluation, management, and counseling of these patients following cannabis exposure.

No, authors do not have interests to disclose

120 Inclusion of Non-English Language Preference Patients in Trauma and Emergency Medicine Related Motor Vehicle Collision Research

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Study Objectives: Individuals with Non-English Language Preferences (NELP), previously referred to as Limited English Proficiency (LEP), represent a growing proportion of the United States (US) population and often seek care in emergency departments (ED). Prior studies demonstrate disparate health outcomes related to NELP status, however, this patient population is often excluded from medical research, making these disparities difficult to track. There is a paucity of literature describing the impact of NELP status on traumatic injury, specifically injury and outcomes related to Motor Vehicle Collisions (MVCs), which represent a significant portion of trauma and acute care visits. The goal of this study was to evaluate emergency medicine and trauma MVC literature to identify inclusion/exclusion of NELP patients and evaluate outcomes of NELP patients who experience traumatic injury from MVCs.

Methods: A systematic search in Cochrane CENTRAL, Embase, Ovid MEDLINE, PubMed and Web of Science Core Collection databases was conducted of US based publications from 2010 to 2021 using key search terms for motor vehicle collisions and emergency and trauma care. Specifically, publications were included if they examined trauma outcomes after MVC, were conducted in the US, and included patients above the age of 18. Titles, abstracts, and full texts of eligible articles were independently evaluated by two reviewers and vetted by a third. Data were extracted using an a priori determined standardized reporting tool to evaluate language as study inclusion/exclusion criteria, manuscript reporting of language, assessment of language as a primary variable, and consideration of language proficiency in study methodology.

Results: A total of 82 studies met inclusion criteria. Twenty three studies (28%) excluded NELP populations and only one study explicitly included NELP populations. None of the studies evaluated language as a primary outcome of the study or included language as a variable in the analysis. Over half of the studies (n=45, 54.9%) utilized a public data set or registry. While none of the registries excluded patients based on NELP status, no identification of NELP patients was publicly available within the data sets.

Conclusion: NELP populations are routinely excluded from and/or difficult to identify in MVC research. No studies included language as a variable when evaluating

outcomes. Failure to understand how NELP populations communicate with care teams and understand care team instructions may lead to worse outcomes for NELP patients experiencing traumatic injury and should be the focus of future study. Without appropriate inclusion and identification, it will not only be difficult to understand the prevalence or outcomes of traumatic injury in NELP patients, but also to develop culturally and linguistically appropriate interventions for patients experiencing traumatic injury in the emergency department.

No, authors do not have interests to disclose

121 Social and Structural Influences of Emergency Care Seeking Behaviors in Documented and Undocumented Adult Safety-Net Patients

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Study Objective: To better understand the emergency care seeking behaviors of documented and undocumented adult safety-net patients.

Methods: We conducted 20 semi-structured interviews with patients during their ED visit. Using a grounded theory approach and qualitative analysis, we developed a set of 13 codes and 7 subcodes describing factors influencing patient's ED care seeking behaviors and experiences. Two researchers coded the transcripts independently using grounded theory techniques. After 4 rounds of independent coding with comparison and refinement after each round, we developed our final codebook, which indicated excellent agreement (pooled $K = 0.94$). Transcripts were analyzed in an iterative process until broad categorical themes arose from the initial codes.

Results: The data indicates that adult safety-net patients decide when and where to seek ED care based on their perceptions of symptom severity and manageability, anticipated benefits of utilizing ED care over other forms of care, and their previous health seeking experiences (or the experiences of family and friends). One patient stated: "And I know here that at the [hospital name retracted] they have good doctors, and they know that all them be taking good care right here. Cause I already came in once for my broken hand and they attend me good. So, I'm like why am I going to go somewhere else when right here they do a good job." Undocumented patients reported facing unique social and structural inequities in comprehensive care access, including health insurance ineligibility, difficulties accessing affordable ambulatory care, and incidences of xenophobia, which influences their emergency care seeking behaviors. For example, patients stated: "I have come in for other circumstances and have been very well attended. I've left very well and well, you have that in mind. Apart from that...this is the place where they were going to serve better than some clinic because if I go to the clinic [I] normally go they don't have neither the specialties that they have here nor the gadgets they have here. That's why I chose to come here because I knew I was very sick and where better than here where I could be served better than in another part?" "The emergency paper that they give us helps us not get charged, we don't have enough money to pay a private clinic that you know is super expensive. Therefore, this is what benefits us."

Conclusion: Safety-net EDs play a crucial role in health care systems – they provide emergency care and address coverage gaps in primary and specialty care access for vulnerable populations, including undocumented immigrants. This study indicates that safety-net patients determine when and where to seek ED care based on perceived severity of symptoms, anticipated benefits of seeking ED care over other forms of care, and previous health seeking experiences. We found that undocumented patients face unique social and structural inequities in health care access, which influences how they utilize ED care. Thus, to promote health care equity and reduce ED burden, it is recommended that public care systems collaborate with safety net EDs in the development of inclusive health policies and programs aimed at reducing existing inequities in comprehensive care access among historically marginalized patient populations, including undocumented immigrants.

No, authors do not have interests to disclose

122 Number of Acute Care Beds Is Not a Reliable Predictor of Emergency Department Volumes in Small Rural/Critical Access Hospitals

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Study Objectives: To evaluate the correlation between annual volumes in emergency department and the number of acute care beds in small US hospitals with less than 20,000 ED visits per year with respect to rurality, critical access hospital (CAH) status and the listed number of acute care beds.

Study Design/Methods: This study employs linked data from the American Hospital Association's 2020 survey and the 2020 US hospital list available through the North Carolina Rural Health Research Program. Data was analyzed using a multivariate regression analysis. Descriptive statistics were employed to visualize the univariate relationships between predictors and outcome prior to regression.

Results/Findings: Of the 6,162 facilities listed in the American Hospital Association data, 2,290 (37%) had less than or equal to 20,000 emergency department visits and were in the NC spreadsheet. Among these 565 (25%) were classified as Urban and 1725 (75%) were rural. Regression analyses identified significant positive associations between emergency department volume and acute care beds ratio (t-statistic= 11.4, p- value <0.001), rurality (t-statistic= 3.5, p-value <0.001), and facilities designated as critical access hospitals (CAHs) (t-statistic= 2.6, p-value <0.001). Statistical analyses identified significant interaction effects for emergency department volume between acute care beds in rural facilities and for rural vs. non-rural critical access hospitals. More specifically, the average effect of acute care beds on predicted ED visits is higher for rural hospitals (than for urban hospitals (red line) (t-statistic= 5.9, p-value <0.001). Furthermore, the average effect of rurality on predicted ED visits is different between critical access (blue line) and non-critical access (red line) facilities (t-statistic= -7.1, p-value <0.001) (Figure 2). Lastly, the overall regression model was statistically significant (F-statistic = 155.1, p-value <0.001) and explained 25% of the variation in ED visits for individual hospitals relative to the average ED visits for the state they were located within.

Conclusion: Most emergency departments with less than 20,000 ED visits are in rural areas. Staffing models for EDs with less than 20,000 annual visits are not well established. A significant number of these are CAHs and are therefore subject to an arbitrary acute care bed cap of 25 beds. The number of acute care beds is widely reported; however, the corresponding ED volumes are less well known. This study demonstrates a mismatch between reported volumes and acute care beds within CAHs when compared to urban and non- CAH facilities. Therefore, annual ED visits are a better predictor of ED use and should guide policy. ED volume should be reported in addition to overall bed capacity.

No, authors do not have interests to disclose

123 Reducing ED Back Pain Bounce-Back Proportion: Prescribing Physical Therapy

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Study Objectives: Low back pain (LBP) accounted for over 2.5 million of United States emergency department (ED) visits in year 2019. Without red flag historical or clinical features such as neurologic deficits or urinary retention this complaint rarely warrants additional workup and can be managed in the outpatient setting. However, patients can experience significant discomfort, and ED return visits are not uncommon with some studies suggesting return rates of 4.5% to 39%. Physical therapy (PT) is a well- described treatment modality for outpatient treatment for LBP after primary care referrals. The purpose of this study was to assess the impact of PT referral directly from the ED on the proportion of patients who returned to the ED for LBP.

Methods: This was a retrospective cohort study of adult patients (18-64 years old) who were discharged from a single-center, Midwest, academic tertiary care ED with an annual volume of approximately 60,000 patients. Patients with an ED discharge diagnosis of atraumatic LBP without radiographic evidence of fracture or dislocation between April 1, 2016 through September 30, 2019 were included in the study. A three-month look back period was applied to ensure patients presenting to the ED during the study period were not seen in the ED for LBP prior to the index ED visit. These patients were classified as having an LBP referral placed (exposed) compared to patients who did not have a referral placed (unexposed). PT-exposed patients were matched with up to two controls by age and sex. Two study investigators manually extracted data using a REDCap survey instrument to ascertain clinical covariates including prescription and over-the- counter medications and prior medical history (eg, diabetes mellitus, alcohol use disorder, substance use disorder). The outcome in this study was return to the ED for LBP within 90 days of the index ED visit.

Results: During the study period, 94 patients were identified that were referred to PT and were matched to 158 patients who were not referred to PT. Males accounted for the majority in each group, 57.4% and 55.1% in the PT and non-PT groups, respectively. The most common age range was 40-44, accounting for 14.9% and 14.6% in the PT and non-PT groups, respectively. Prior to arrival (PTA), 56% of the

PT group reported NSAID use compared to 36% in the non-PT group. PTA Topical agent use (eg, lidocaine and ketorolac) was more common in the PT group compared the non-PT group (4.3% vs 1.9%, respectively, $p<0.01$), and were more commonly prescribed at discharge in the PT group (14% vs 3%, respectively, $p<0.01$). For return to ED within 90 days, the odds of returning to the ED was greater in the non-PT group compared to the PT group (unadjusted OR: 13.7; 95% CI: 1.8-101.8).

Conclusions: Atraumatic LBP patients seen in the ED may benefit from a PT referral at time of ED discharge with a reduction in return visits for LBP within 90 days.

No, authors do not have interests to disclose

124 Utility of Point-of-Care Ocular Ultrasound in the Evaluation of Periorbital and Orbital Infections

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Study Objectives: Periorbital and orbital infections are one of the frequent reasons for emergency department (ED) visits. Emergency Physician-performed point-of-care ultrasound (POCUS) has become more prevalent in the evaluation of patients presenting to the emergency department (ED). The objective of this study is to determine the utility of POC ocular ultrasound in the assessment of patients presenting to the ED with suspected preseptal and septal (orbital) cellulitis.

Methods: This was a retrospective review of ED patients presenting with suspected periorbital and orbital infectious symptoms who received a POC ocular ultrasound examination over a seven-year period. This study took place at two academic urban EDs with a total annual census of 125,000. An ED POCUS database was reviewed for ocular POCUS examinations. We then reviewed electronic health records for demographic characteristics, history, physical exam findings, ED course, additional imaging studies, and impact of POCUS on both patient care and disposition. Descriptive statistics were used to summarize the data.

Results: A total of 29 subjects (15 males, 14 females) were included in the final analysis. The mean age was 46 years. The most common presenting symptoms were eye pain with swelling (41%) and eye pain with swelling and redness (17%). The following were identified in our study subjects on ocular ultrasound: 1) Preseptal cellulitis (n=29), 2)Preseptal cellulitis with abscess (n=4), and 3) preseptal cellulitis with septal cellulitis (n=5). Soft tissue thickening over the eyelid was the most common finding on ocular POCUS, seen in 97 % of patients. Increased echogenicity of the ocular muscles was the next most common and found in 79% of patients. POCUS was utilized for medical decision making in 97% of subjects. When utilized, POCUS resulted in early initiation of antibiotics in 100% of subjects, initiation of early consultation in 68% of subjects, and avoided unnecessary additional imaging in 13% of subjects.

Conclusion: Our study findings illustrate the utility of POC ocular ultrasound to distinguish preseptal from septal cellulitis, impact on early initiation of interventions, consultations, and the avoidance of additional unnecessary imaging in the ED.

No, authors do not have interests to disclose

125 Evaluation of Normal Reference Ranges for Ultrasound Measurements of the Hip Joint in Elderly Patients

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Study Objectives: Ultrasound can be used to evaluate for effusion of the hip joint, which may be useful in screening for septic arthritis or occult injury. The current reference range for this measurement is based on decades- old ultrasound machine technology and hip joint capsule size was used as a surrogate for presumed presence of hip effusion. Normal range is a hip joint capsule (measured from anterior femoral neck to posterior iliopsoas) is <7mm or a 1mm or less difference between sides). The primary objective of this study was to determine whether the current reference range for this measurement is accurate and is sufficiently specific for abnormal hip joint capsule size in the elderly population. The null hypothesis is that the values are unchanged from the reference standard.

Study design: This was a retrospective analysis of 81 patients over the age of 50 with chief complaint not related to their hips, and without current hip pain or history of hip surgery presenting to the emergency department. Review of bilateral hip joint capsule measurements was done by ultrasound faculty or fellows to determine hip joint capsule size. Further information was gathered from the electronic medical record including age, BMI, and sex. This study was approved by the institutional review board.

Results: 81 patients who met inclusion criteria were enrolled. 17/81 (21%) had hip capsules measuring 7mm or more and 20/81 (24.7%) of subjects had capsule size greater than 1mm between sides. 95% of subjects were found to have bilateral hip capsule measurements below 8.5 mm.

Conclusion: Our study found that a significant subset of patients over the age of 50 were in the abnormal range for hip capsule size, though mostly without effusion, which could potentially lead to unnecessary testing and invasive procedures. While changing the cut-off of normal hip capsule measurement to 8.5 mm could decrease false positives, this will likely lead to missed true effusions, subsequently decreasing the sensitivity of point-of-care hip ultrasound, perhaps to an unacceptable level for our practice in emergency medicine. Further evaluation is necessary into better surrogates such as actual visualization and measurement of hip effusions, which is possible with current ultrasound technology.

No, authors do not have interests to disclose

EMF 126 Results of a Pilot Linkage to Care Intervention for HIV Negative Emergency Department Patients Referred for Pre-exposure Prophylaxis (PrEP)

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Study Objectives: Preventing new cases of HIV is a critical step to ending the HIV epidemic. Pre-exposure prophylaxis (PrEP) is a highly effective but underutilized method of preventing HIV transmission. Emergency departments (EDs) are known to be an ideal setting to identify patients who are at-risk for HIV acquisiiton. Identifying, screening, and linking PrEP-eligible patients to PrEP providers from the ED could increase PrEP uptake among at-risk patient populations.

Methods: We performed a prospective pilot study in a single urban academic ED from 1/1/21 – 12/31/21. ED patients completed a HIV risk assessment as part of the ED's established HIV screening program. Patients were determined to be PrEP eligible based off their responses and in accordance with 2017 CDC PrEP eligibility criteria. Identified PrEP-eligible patients then completed a PrEP questionnaire by the same counselor. PrEP-eligible patients received a linkage to care (LOC) intervention to a PrEP provider which mirrored the program's LOC intervention for patients who test positive for HIV. The primary outcome was the proportion of PrEP-eligible patients who initiated PrEP medication determined by patient self-report and chart review.

Results: In 2021, 1532 patients were approached by the screening program, of which 447 (29%) were PrEP eligible. Of these, 60% were male (N=270) and 40% White (N=180) with a median age of 32 (IQR 25- 40). 2.9% (13) were men who have sex with men (MSM), 12.5% (56) were heterosexual men and women (HMW), and 15.9% (71) were persons who inject drugs (PWID). Of the 447 patients, 39 linkage cases were started. No patients were linked to care (defined as attending an appointment with a PrEP provider). Common reasons why patients were not linked to care included: patient declined – "not their primary concern", inability to contact patient, and patient declined - does not need or want linkage. Zero patients initiated PrEP medication.

Conclusion: Although this pilot study successfully identified ED patients eligible for PrEP, patients were not linked to PrEP care after performing a linkage to care intervention that mirrors that of HIV-positive patients. This suggests that LOC efforts

that are standard in existing ED HIV screening programs may be insufficient and more robust, tailored efforts are needed for this distinct patient population.

Yes, authors have interests to disclose

Disclosure: Gilead Sciences Inc

Grant Support

Gilead Sciences Inc

127 Effect of Metformin on Survival Outcomes in In-Hospital Cardiac Arrest Patients With Diabetes

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Study Objectives: Metformin is associated with reduced mortality in patients with diabetes mellitus (DM). In cardiac arrest and ischemia-reperfusion injury animal models, metformin has shown cardioprotective and neuroprotective effects. Therefore, this study aimed to determine the association between metformin and survival outcomes in in-hospital cardiac arrest (IHCA) patients with type 2 DM (T2DM).

Methods: This retrospective observational study included adult IHCA patients with T2DM between January 2018 and December 2020. Administration of diabetes medications within 24 h before IHCA that were confirmed using electronic medical record was collected. The primary outcome was survival to discharge. Multivariable logistic regression analysis was performed.

Results: Of total 252 included IHCA patients, administration of metformin within 24 h before IHCA was associated with a higher rate of survival to discharge and good neurologic outcome (38.2% vs 9.6%, $P < 0.001$ and 20.6% vs 3.7%, $P < 0.001$, respectively). Administration of metformin within 24 h before IHCA was independently associated with survival to discharge and good neurologic outcome (adjusted odds ratio [aOR]: 5.64, 95% confidence interval [CI]: 1.74–18.27, $P = 0.004$ and aOR: 5.66, 95% CI: 1.26–25.40, $P = 0.024$, respectively).

Conclusions: Administration of metformin within 24 h before IHCA was independently associated with survival to discharge in IHCA patients with T2DM.

No, authors do not have interests to disclose

128 Impact of a Cadaver Lab and Video Content-Based Curriculum on Emergency Physician and Advanced Practice Provider Performance Confidence and Clinical Utilization of Ultrasound-Guided Knee and Ankle Arthrocentesis

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Study Objectives: The diagnosis of septic arthritis cannot be ruled out without performing an arthrocentesis. Delay in diagnosis leads to potentially irreversible joint damage and patient mortality. It is essential for emergency physicians (EPs) and advanced practice providers (APPs) to perform this procedure. Ultrasound guidance during arthrocentesis has been shown to reduce procedural pain scores and improve first-pass success rates compared to a landmark-guided approach. However, many providers trained when ultrasound was not readily available and feel uncomfortable recognizing a joint effusion on ultrasound. The study objective was to assess the impact of a hands-on cadaver lab arthrocentesis training on emergency medicine provider confidence in performing knee and ankle ultrasound-guided arthrocentesis and subsequent utilization in clinical practice.

Methods: EPs and APPs from a large academic, quaternary-care hospital prospectively enrolled in a 2-hour cadaver lab ultrasound-guided arthrocentesis training intervention. Didactic video content was created and distributed prior to cadaver lab training. The cadaver knee and ankle joint capsules were pre-injected with saline to create realistic effusions. Participant confidence performing and interpreting US-guided arthrocentesis was assessed pre- and post-cadaver lab via electronic survey based on a 0-10 scale (0=not confident at all, 10=extremely confident). Ultrasound-guided knee and ankle arthrocentesis utilization in clinical practice was compared before and after the cadaver lab which was held on October 4, 2021. The pre- intervention comparison time frame was January 1, 2019-December 31, 2019 to avoid changes in ED visits and practice associated with the COVID-19 pandemic. The post-intervention comparison time frame was October 5, 2021 through April 4, 2022. Median confidence scores with interquartile ranges (IQR) and monthly rates of ultrasound-guided arthrocentesis were calculated and presented with 95% confidence intervals.

Results: A total of 28 emergency providers participated in the ultrasound-guided arthrocentesis cadaver lab (17 EPs, 10 APPs, 1 unknown) and 28 (100%) completed both pre- and post-intervention surveys. Sixty-one percent (17/28) of participants had greater than 5 years of post-training clinical practice. The median (IQR) confidence rating was 7.5 (IQR 5.0-9.0) pre-intervention and 8.0 (IQR 6.0-9.8) post-intervention ($p=.153$) for performance of ultrasound-guided knee arthrocentesis and was 2.5 (IQR 1.0-4.3) pre-intervention and 7.0 (IQR 6.0-8.8) post-intervention ($p< .001$) for performance of ultrasound-guided ankle arthrocentesis. Ultrasound-guided knee arthrocentesis utilization increased from a monthly average of 2.3 (95% CI 1.5-3.3) pre-intervention to 6.3 (95% CI 4.5-8.6) post-intervention, rate ratio 2.74 (95% CI 1.64 – 4.63), $p< .001$. Ultrasound-guided ankle arthrocentesis utilization increased from a monthly average of 0.8 (95% CI 0.4-1.5) pre-intervention to 2.5 (95% CI 1.4-4.1) post-intervention, rate ratio 3.02 (95% CI 1.27 – 7.53), $p= .009$.

Conclusion: Our data demonstrate that a cadaver-based educational intervention increased EP and APP confidence in performing ultrasound-guided ankle arthrocentesis and increased ultrasound-guided ankle and knee arthrocentesis utilization in clinical practice. Further studies are needed to determine if this resulted in a meaningful reduction in time to diagnosis and ED length of stay.

No, authors do not have interests to disclose

129 Establishing an Outpatient Rapid Assessment Service for Patients With Suspected Malignancies

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Objective: 11% of new cancer diagnoses are made in the emergency department (ED). ED-mediated cancer diagnoses disproportionately affect patients of lower socioeconomic statuses who are unmarried, Hispanic or Black, and have three or more comorbidities. Their cancer diagnoses are often associated with higher mortality rates. During an ED visit, a physician may become concerned for malignancy based on initial diagnostic tests. Even though laboratory and radiology tests performed during a patient's ED stay may be concerning for a malignancy, most of these patients are stable and safe for discharge home and further outpatient evaluation. Without a predefined and easily accessible outpatient pathway, patients with a suspected new cancer diagnosis may have difficulty arranging follow-up. in addition, there may be concerns about the patient's ability to navigate a complex health care system in scheduling timely outpatient follow-up. The objective of the Rapid Assessment Service (RAS) program is to coordinate timely outpatient follow-up for patients with suspected malignancies. The service aims to seamlessly diagnose and coordinate a treatment plan for these patients from the ED.

Methods: Through a partnership between the departments of emergency medicine and oncology, the hospital established a Rapid Assessment Service program. Patients with suspected neoplastic lesions who did not meet admission criteria were discharged with RAS clinic follow-up. The program aimed to see patients within 2 business days to expedite an outpatient work-up at the affiliated cancer center. This is a retrospective observational analysis of 80 patients who were discharged to RAS.

Results: Between February 2020 and March 2021*, 80 patients were referred to the RAS from the emergency department. 72 of the 80 patients (90%) who were referred to the clinic either were seen in clinic or were determined to have reliable treatment plans elsewhere, and 8 patients (10%) were lost to follow up. 37 of the 80 patients (46%) followed up in the RAS. On average, patients were seen in the clinic 2.7 days, with a 95% confidence interval [0, 6.4 days] from the ED referral date, and 22 of the 37 patients (59%) were evaluated within the target two business days. Overall, 19 of the 37 (51%) patients seen in the clinic ultimately had new cancer diagnoses: 7 genitourinary, 4 gastrointestinal, 2 pancreatic, 2 lung, 2 hematologic, 1 liver, and 1 head and neck cancer.

Conclusions: Creating a Rapid Assessment Service facilitates an expedited oncologic work-up while prioritizing patient comfort in an outpatient setting. This allows for a more compassionate clinical care model. This service allows providers to safely discharge vulnerable patients, and it reassures patients that they will receive timely care after being given potentially life-changing news in the ED. *We plan to present additional data through 2022 by the time of ACEP22 for a total of 176 patients.

Type of Cancer	n = 19	%
Genitourinary	7	36.8%
Gastrointestinal	4	21.1%
Pancreatic	2	10.5%
Lung	2	10.5%
Hematologic	2	10.5%
Liver	1	5.3%
Head & neck	1	5.3%

No, authors do not have interests to disclose

130 Novice-Performed Point-of-Care Ultrasound for Home-Based Imaging

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Study Objectives: As delivering health care in alternative settings becomes more common, portable imaging technologies aiding medical decision-making will be key. Patient-performed point-of-care ultrasound (POCUS) scanning may be feasible for use in home-based medical care. Here, we investigated whether novice users can obtain lung ultrasound (LUS) images via self-scanning with similar interpretability and quality as experts.

Methods: We performed a prospective observational trial comparing novice- to expert-obtained LUS images. A total of 30 healthy adult volunteers with no prior medical or POCUS training were recruited. After viewing a training slide show, volunteers self-performed an 8-zone LUS in their own home and saved images using a hand-held POCUS device without expert guidance. The 8-zone LUS scan was then repeated on each volunteer by POCUS experts. LUS clips were independently viewed and scored by two POCUS experts blinded to the performing sonographer. Quality and interpretability scores of novice self-performed and expert-obtained LUS images were compared.

Results: In total, 30 healthy volunteers with an average age of 42.8 years (SD 15.8), and average body mass index of 23.7 (SD 3.1). Overall quality of novice and expert scans did not differ (median score 2.6, IQR 2.3-2.9 vs. 2.8, IQR 2.3-3.0, respectively p=0.09). Quality among individual zones also did not differ (P>0.05). Interpretability of LUS was similar between expert and novice scanners (median 7 zones interpretable, IQR 6-8, for both groups, p=0.42). Interpretability of novice- and expert-obtained scans did not differ, compared to expert-obtained scans (median 7 out of 8 zones, IQR 6-8, p=0.42). Agreement between expert raters on determining scan interpretability was excellent (kappa for novice scans =1.00 (CI 1.00-1.00); kappa for expert scans =0.98 (CI 0.94-1.00)).

Conclusion: Patients with no prior POCUS experience and minimal training can obtain interpretable, expert-quality LUS clips from self-performed scans. This pilot study suggests patient performed LUS may be feasible for outpatient home monitoring.

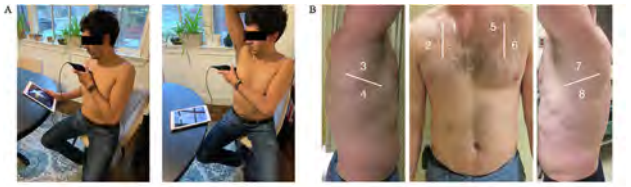

Figure 1. Novice-performed lung ultrasound scanning protocol. **A**. A novice self-performs a LUS using a hand-held ultrasound probe attached to an iOS device. **B**. 8-zone scanning protocol performed by both novices- and expert-sonographers.

Yes, authors have interests to disclose
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Disclosure: Serves as the 3rd vice president and board of governor for the American Institute of Ultrasound in Medicine, and is the Governor-elect of the Alberta Chapter of the American College of Physicians
Board Member/Officer/Trustee
Serves as the 3rd vice president and board of governor for the American Institute of Ultrasound in Medicine, and is the Governor-elect of the Alberta Chapter of the American College of Physicians
Disclosure: consulting with Level Ex
Consultant/Advisor consulting with Level Ex
Disclosure: Former Chief Medical Officer of Centaur Labs, Inc, and currently owns equity in Centaur Labs, Inc
Stockholder
Former Chief Medical Officer of Centaur Labs, Inc, and currently owns equity in Centaur Labs, Inc
Disclosure: consulting with Exo
Consultant/Advisor consulting with Exo

131 Adulterated Heroin: Presentations and Outcomes of a Large Case Series of Contaminated Heroin

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Objective: Cocaine and heroin frequently undergo dilution and adulteration along the distribution path to increase the number of doses available as well as to modify the drugs effect. Diluents, such as talc, are pharmacologically inactive. Adulterants are pharmacologically active and multiple agents with disparate mechanisms of action are often present together. This case series of adulterated heroin resulted in an epidemic of emergency department (ED) evaluations. The causative adulterants are currently undergoing analysis.

Method: We performed a retrospective chart review of patients presenting to a single ED from September 11, 2022, through September 30, 2022. Medical records were collected on day 2 of an outbreak after a much larger than expected number of opioid overdoses appeared with similar abnormal vital signs: severe bradycardia and hypertension, despite appropriate out-of-hospital resuscitation with naloxone. Through the patients' history, and a subsequent law enforcement investigation, we confirmed the involved samples were obtained from the same source and patient volume diminished with subsequent removal of the supply source. Plasma and serum samples from blood draws upon ED arrival are currently undergoing toxicology studies for causative adulterants.

Results: A total of 94 patients presented to the ED, 66% within the first 72 hours; however, in cooperation with law enforcement and nearby hospitals, we estimated another 26 patients were similarly affected in the community. The mean age was 45.4 (21-72 years) with 79 (84%) being male. Fifty-five patients required hospital admission after initial ED management with 4 requiring ICU level care and 5 step-down unit level care. There was one death in the ED and 2 deaths amongst inpatients. All 3 patients presented in asystolic cardiac arrest after heroin use. Two patients achieved return of spontaneous circulation but subsequently died of severe anoxic brain injury and multiorgan failure. Eleven patients required further naloxone dosing in the ED, with no further complications. Fifty-seven (62%) had bradycardia with a mean heart rate of 59 (IQR 45-65.5) and 31 (33%) had systolic blood pressure greater than 160 mmHg and 25 with diastolic blood pressure greater than 100 mmHg. 66 patients had troponin levels measured and 28(42%) were above the positive threshold (range 0.03-11.7 ng/mL). Thirty-five patients had an echocardiogram with 10 (28%) demonstrating diastolic dysfunction. Five patients underwent cardiac stress testing (4 nuclear and one stress echo) with all studies being normal. No patients underwent cardiac catheterization. Most patients remained bradycardic and hypertensive for the remainder of their hospitalization with no requirement for further medical intervention or cardiac pacing. The mean length of stay for 55 patients was 3.2 days (IQR 2-4).

Conclusion: This case series describes bradycardia and hypertension not expected after standard care of opioid overdose. The prolonged duration of the toxidrome is unusual for common adulterants of heroin. Deaths were noted in those presenting in cardiac arrest but not amongst those with mild symptoms or respiratory depression

responsive to naloxone. Despite presenting with significantly abnormal vital signs, patients did well with supportive care allowing for natural metabolism to occur.

No, authors do not have interests to disclose

132 Role of Future Artificial Intelligence Tools for Transitional Care Between Emergency and Primary Care

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Study Objectives: (1) Articulate the current state of artificial intelligence (AI) tools for transitional care; (2) Surface pain points for clinicians and patients; and (3) Propose a realistic future state to harness the power of AI at the intersection of emergency and primary care.

Methods: We performed a literature review between September 2021 and March 2022 using terms pertaining to AI and machine learning (ML) in primary care, emergency care, transitional care, and medicine. Using quality improvement (QI) methodologies, we conducted a current state analysis of the current system and physician and patient pain points between primary and emergency care environments. The issues were built into a prioritization matrix grading impact and fit for AI-enabled solutions. A future state analysis then ideated possible AI-enabled solutions to address these priority domains.

Results: Of the thirty-two challenges identified in the current state analysis, fourteen were both high impact and a good fit for AI-enabled solutions. Themes include tools for discharge/follow-up, triaging/predicting models of care, interoperability, access to mental health follow-up, language translation, and system navigation for seniors. Barriers to implementation of AI solutions were also examined. Specifically, AI-enabled post emergency department (ED) discharge tools could automatically schedule primary care follow-up, determine follow-up type, model of care and optimal timing. They could also match patients with available behavioral interventions and mental health resources. AI and natural language processing could analyze EHR data and surface important highlights and create tighter post-visit summaries. Translation capacities could be addressed by AI language models. Digital ED discharge instructions could be translated into the patient's preferred language and explain medical jargon. Seniors could benefit due to frequent ED visits, complex health, accessibility and functional limitations. Speech is the most natural way of engaging and AI-driven voice assistance tools could be an equalizer for seniors, especially those without caregiver support. Barriers to implementation include lack of interoperability of health information systems, lack of data standards, lack of funding for AI innovations in this space, and lack of policies and incentives for providers/systems to do better in fee-for-service systems that profit from transitional care failures.

Conclusion: Transitional care between primary care and emergency care remains fraught with challenges. AI has the potential to address many of these challenges and improve transitional care for the benefit of patients, physicians, and health systems.

Themes	High impact pain points	Future AI-based solutions	Barriers/risks for AI-based solutions
Support for discharge/follow-up	• Patients discharged from ED without warm handoff • Limited capacity of PCPs to check in with patients post-ED visit • Uncertainty regarding the primary coordinator for follow-up care	• Post-ED discharge risk tool • Automation of scheduling follow-up care • Automated message sent to PCP when their patient is admitted to ED • Chatbot trained to answer common post-discharge questions	• Limited evidence available on usability/feasibility of such tools • Increased burden on physicians due to additional messages
Triage and prediction of models of care	• Lack of assignment of appropriate model for follow-up care post-ED visit	• Triage tool for appropriate model of care	• Limited generalizability due to non-uniform models of care across health systems
Interoperability	• Lack of interoperability within and between health systems and providers • Important data buried in EHR, limiting ED and PCP view of patient history • Opaque transition between ED and skilled nursing facilities	• Promotion of standard data formatting in EHRs • Use of NLP to surface key highlights from patient history • Use of NLP to synthesize info from ED visit and generate post-ED visit summary	• Industry incentives against interoperability • Training data highly sensitive and difficult to access • Privacy concerns
Access to mental health care	• Limited access to psychiatry	• Triage tool for appropriate model of care • Matching patients to available behavioral interventions and mental health resources	• Outdated resource databases • Capacity constraints
Translation	• Limited ability to translate ED discharge instructions	• Automated translation of discharge instructions into language of patient's choice • Automated translation of medical jargon	• Quality of translation technology
System navigation for seniors	• Lack of senior friendly technology that assist with follow-up care	• Voice assistance	• Capacity to provide training

No, authors do not have interests to disclose

133 Rates and Predictors of Emergency Department Mis-Triage: A Multiyear, Multicenter Study

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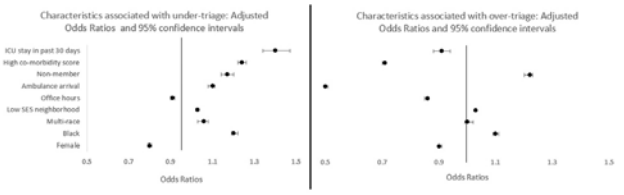
Study Objectives: The five level Emergency Severity Index (ESI) is used in over 70% of emergency departments (ED) across the U.S. to sort patients based on predicted acuity and resource needs. Most studies assessing the validity of the ESI are based on expert opinion through chart review or case simulations with highly variable performance. We developed objective measures to define under- and over-triage for each ESI level, to estimate the frequency of mis-triage, and assess patient and visit characteristics associated with mis-triage in a multi-center practice setting.

Study Design: We defined under- or over-triage of adult ED patients for each potential ESI level based on objective events that occurred during the ED visit. These events included counts of resource use, as well as a hierarchy and timing of critical outcomes, including procedures, medications dispensed, blood product transfusions, and emergent transfers to higher levels of care. We then applied these definitions to assess the mis-triage frequency among all adult ED patients presenting between 2016-2020 to 21 medical centers in Northern California by ESI triage assignment. We collected patient sociodemographic and clinical characteristics and defined visit characteristics prior to ED triage time. We then used multivariable regression analysis to identify patient demographic and visit characteristics statistically significantly associated with under-triage (compared to appropriate triage) and over-triage (compared to appropriate triage).

Results: Our cohort included 5,315,176 eligible ED encounters across the 21 medical centers between January 1, 2016 and December 31, 2020. Nearly two-thirds were assigned a mid-acuity level (ESI III), and >98% were assigned to one of the three mid-acuity ESI levels (II-IV). Mis-triage occurred in over 32% of encounters, of which 10% were under-triaged and 90% were over-triaged. Among the most critically ill patients (those requiring endotracheal intubation, vasopressor support, aggressive blood transfusion, or emergent transfers), 42% were under-triaged. As shown in Figure 1, in multivariate analyses, we found significant sociodemographic disparities in under- and over-triage. Additional patient clinical characteristics, including higher co-morbidity burdens, recent intensive care unit (ICU) stays, arrival by ambulance, and non- office hours ED arrival time significantly predicted mis-triage.

Conclusion: To our knowledge, this is the most robust assessment of the accuracy of the ESI applied in clinical practice. Identified mis-triage rates and associated characteristics represent significant opportunities to improve equity and timely clinical care.

Figure 1: Patient and visit characteristics associated with under-triage (left graph) and over-triage (right graph) in adjusted analyses.



Notes: Reference group for each characteristic: No ICU stay, low co-morbidity score, health plan member, non-ambulance arrival, non-office hour arrival (office hours = M-F, 9a-5p), each standard deviation increase in neighborhood socioeconomic (SES) index, white, and male. Model also adjusted for: age, primary language, study year, study ED, high-risk outpatient medications (such as chemotherapy, immunosuppressants, or anti-coagulants), prior inpatient and ED visits, and triage vital signs.

No, authors do not have interests to disclose

134 Diagnostic Accuracy of the Physical Exam in Patients With Vertigo or Dizziness Presenting to the Emergency Department: A Systematic Review and Meta Analysis Supporting the Guidelines for Reasonable and Appropriate Care in Emergency Medicine

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Study Objectives: History and physical exam are key features to narrow the differential and help establish a diagnosis of central versus peripheral causes in patients presenting to the ED with acute vertigo. We conducted a systematic review and meta-analysis of the diagnostic test accuracy of physical exam findings.

Methods: An electronic search was designed following patient-intervention-control-outcome (PICO) question, (P) adult patients with vertigo presenting to the ED; (I) presence of specific physical exam or history findings; (O) central (ischemic stroke, hemorrhage, tumor, others) versus peripheral cause of symptoms. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed. Each report was assessed by 2 independent reviewers.

Results: From 6,309 titles, 458 articles were retrieved, and 44 met the inclusion criteria. We included studies that reported diagnostic test accuracy to differentiate central from peripheral causes of vertigo. General Neurologic Exam: 5 studies, 869 patients, pooled sensitivity 46.8% (CI 32.3%, 61.9%) and specificity 92.8% (CI 75.7%, 98.1%). Peripheral weakness: 4 studies, 893 patients, sensitivity 11.4% (CI 5.1%, 23.6%) and specificity 98.5% (CI 97.1%, 99.2%). Spontaneous Nystagmus: 6 studies, 621 patients, sensitivity 52.3% (CI 29.8%, 74.0%) and specificity 42.0% (CI 15.5%, 74.1%). Truncal/Gait Ataxia: 10 studies, 1,810 patients. Increasing severity of truncal ataxia had an increasing sensitivity for central etiology. Sensitivity 69.7% (CI 43.3%, 87.9%) and specificity 83.7% (CI 52.1%, 96.0%). Cerebellar signs: 4 studies, 1,135 patients, sensitivity 24.6% (CI 15.6%, 36.5%) and specificity 97.8% (CI 94.4%, 99.2%). Head Impulse Test: 17 studies, 1,366 patients, sensitivity 76.8% (CI 64.4%, 85.8%) and specificity 89.1% (CI 75.8%, 95.6%). Nystagmus Type: 16 studies, 1,366 patients. Bidirectional, vertical, direction- changing, or pure torsional nystagmus are consistent with a central cause of vertigo. Sensitivity was 50.7% (CI 41.1%, 60.2%) and specificity 98.5% (CI 91.7%, 99.7%). Test of Skew: 15 studies, 1,150 patients. Skew deviation is considered abnormal and consistent with central etiology. Sensitivity was 23.7% (CI 15%, 35.4%) and specificity 97.6% (CI 96%, 98.6%). HINTS (Head Impulse, Nystagmus, Test of Skew): 14 studies, 1,781 patients, sensitivity 92.9% (CI 79.1%, 97.9%), specificity 83.4% (CI 69.6%, 91.7%). HINTS+: 5 studies, 342 patients, sensitivity 99.0% (CI 73.6%, 100%) and specificity was 84.8% (CI 70.1%, 93.0%).

Conclusion: A complete neurological exam including gait evaluation can help determine etiology in patients with vertigo or dizziness. HINTS is the most sensitive exam finding to differentiate central vs peripheral cause of symptoms.

No, authors do not have interests to disclose

135 Impact of Race and Ethnicity on Cranial CT Use in Children With Minor Head Trauma

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Objective: Prior data suggest disparities in use of computed tomography (CT) after minor blunt head trauma (BHT) in children between White and minority races/ethnicities. The objective of this study was to determine if clinician-perceived patient race or ethnicity is associated with CT ordering in children after minor BHT. We hypothesized that previously identified disparities will decrease due to the impact of previously developed BHT prediction rules.

Methods: We performed an a priori analysis of a large, multicenter prospective study of children (<18 years) with minor BHT at six level 1 pediatric trauma centers. Clinicians documented their perception of patient race as American Indian/Alaskan native, Asian, Black, Native Hawaiian/Pacific Islander, White, or other. Ethnicity was documented as Hispanic/Latino, non-Hispanic/Latino. The outcome of interest was cranial CT use. Injury severity was assessed using previously derived (PECARN) clinical prediction rules for children with minor BHT. We used multivariable logistic regression to control for site and injury severity to determine impact of race and ethnicity on CT use.

Results: A total of 20,316 patients were enrolled including 17,919 (88%) with both race and ethnicity documented, making up the analytic population. The median age was 5.0 (IQR 1.7, 11) years and 59% were male. Race was documented as: American Indian/Alaskan native 55, Asian 837, Black 3,351, Native Hawaiian/Pacific Islander 70, White 8,247, or other/multiple 5,747. Ethnicity was documented as Hispanic/Latino in 9,701 (54%). In patients $\geq$ 2 years, compared to White patients, no difference in CT use was found for Asian (OR = 1.01 [95% CI 0.80, 1.27]) or Black race (OR = 1.06, 95% CI 0.93, 1.22]) or Hispanic ethnicity (OR=0.94, [95% CI 0.84, 1.05]). In patients < 2 years, compared to White patients, no difference in CT use was found for Asian (OR = 0.85 [95% CI 0.56, 1.30]) or Black race (OR = 1.05, 95% CI 0.81, 1.35]) but less CT use was found among Hispanic patients (OR = 0.77 [95% CI 0.63, 0.94]).

Conclusions: Although most of the previously identified disparities in CT use for children with BHT were not identified in this study, Hispanic children younger than 2 years received CTs less frequently than White patients.

No, authors do not have interests to disclose

136 Ambulatory Follow-up After Emergency Department Discharge and Association With Outcomes Among Older Adults With Alzheimer's Disease and Related Dementia

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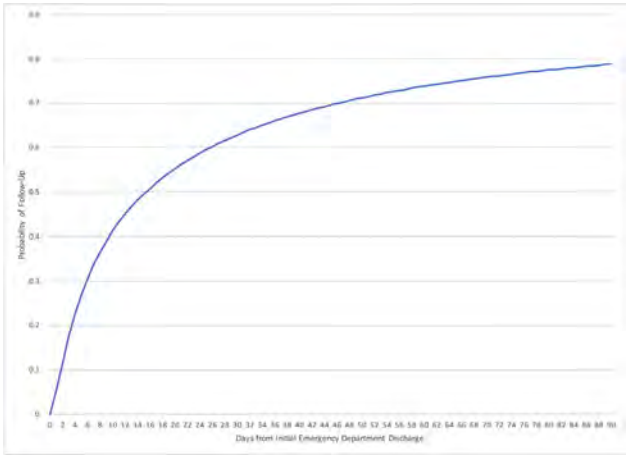
Objectives: Among older adults living with dementia, nearly 1 in 2 will experience an ED visit annually. Most ED visits among those with dementia result in discharge from the ED; however, they are associated with more frequent ED revisits and hospitalizations. Little is known regarding how often older adults with Alzheimer's disease and related dementias (ADRD) have a follow-up visit after ED discharge and what outcomes are associated with those who have follow-up.

Methods: We conducted an observational study of ED visits resulting in discharge among Medicare beneficiaries aged 65 and older from 2011-2016. We included continuously enrolled beneficiaries with a history of Alzheimer's disease and related dementias (ADRD) as defined by the Chronic Conditions Warehouse. We excluded patients who died, were transferred, observed, hospitalized, or discharged to a nursing facility or rehabilitation center. We identified characteristics associated with any non-ED ambulatory follow-up visit within 30 days, including beneficiary characteristics (age, sex, race, Medicaid eligibility), principal visit diagnosis category (using 38 categories designed for emergency care health services research), and hospital factors (size, region, urban/rural location, teaching status, ownership, safety-net status). We fit a Kaplan-Meier curve to estimate the time-dependent probability of ambulatory follow-up after ED discharge, treating death as a competing risk and 30 days as the censoring time. We fit a Cox regression model with time to follow-up as outcome, death as a competing risk, 30 days as the censoring time, and adjusted for all covariates and hospital-level clustering by stratifying by hospital. We performed 3 separate Cox regression models for mortality, ED revisits, and hospitalizations within 30 days of ED discharge, using the same specifications as the follow-up model and also including follow-up visit as a time-varying covariate.

Results: Between 2011-2016, there were 2,075,085 ED discharges among beneficiaries with ADRD. Mean age was 82.3 years, 65.3% were women, 11.8% were Black, and 2.5% were Hispanic. The rate of ambulatory follow-up was 33.8% within 7 days and 62.8% within 30 days. With respect to outcomes, 2.8% died, 22.8% experienced an ED revisit, and 15% were hospitalized within 30 days. Characteristics associated with lower hazard of post-discharge ambulatory follow-up included Medicaid eligibility (HR 0.73, 95% CI 0.72-0.73; P<.001); Black race (HR 0.87, 95% CI 0.85-0.88; P<.001); treatment at a rural ED (HR 0.75, 95% CI 0.73-0.78; P<.001). After adjusting for patient and hospital characteristics, beneficiaries who completed ambulatory follow-up had a lower hazard of mortality (HR 0.43, 95% CI 0.42-0.44; P<.001), higher hazard of ED revisit (HR 1.06, 95% CI 1.06-1.07; P<.001) and higher hazard of hospitalization (HR 1.16, 95% CI 1.15-1.16; P<.001) within 30 days.

Conclusion: Follow-up care after ED discharge is associated with reduced mortality; however, one in three older adults with dementia lacks follow-up care within 30 days. Beneficiaries with dementia who are Black, eligible for Medicaid, and are treated at rural hospitals experience disproportionate barriers to accessing care, which exacerbates disparities in health outcomes for this vulnerable group.



No, authors do not have interests to disclose

137 Does Boarding Time in the Emergency Department Contribute to Mortality Among Those Who Are Mechanically Ventilated?

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Objective: With emergency department (ED) crowding, poor patient flow, and overwhelmed hospital systems, ED boarding is common. Boarding time (BT) has previously been associated with numerous negative patient outcomes, including increased in-hospital mortality, hospital length of stay, and decreased ventilator free days. There is little data on the association between BT and mortality among those who receive mechanical ventilation (MV) in the ED. We hypothesized that BT was associated with increased mortality and decreased hospital free days (HFD) in subjects who received MV in the ED.

Methods: We performed a retrospective cohort study using a database of subjects who received MV at two EDs within an academic health system between January 2016 and June 2019. Our primary outcome was patient mortality, and secondary outcome was HFD. Subjects who received MV were identified by automatic query. Demographic data, laboratory results and outcomes were similarly abstracted. BT was defined as hours after initial admission order was placed. Indication for MV was determined by manual chart review. HFD were defined as days not hospitalized in a 28-day period. Charlson comorbidity index (CCI) was calculated from abstracted data. Sequential Organ Failure Assessment (SOFA) score was calculated by the electronic health record. Subjects were excluded if they had missing or erroneous essential data. Descriptive statistics were performed as indicated. A multivariate logistical regression model was created to determine if BT was an independent predictor of mortality. A planned subgroup analysis based on indication for MV was also performed using Pearson correlation. Statistical analysis was performed in SPSS version 28. A p value < 0.05 was considered statistically significant.

Results: Of 574 subjects included, median BT was 2.3 hours (IQR 1.4-3.7) and mortality was 31.7%. BT was negatively associated with mortality in univariate analysis ($z = -3.05$, $p = 0.002$). Compared to BT $<$ 1hrs, subjects with BT $>$ 6hrs had lower mortality ($z = 5.62$, $p = 0.018$). Multivariate analysis showed no association between BT and mortality when adjusted for age, lactate, SOFA score and CCI ($p = 0.074$). There was no significant association between BT and HFD overall. Notably, increased BT was correlated with decreased SOFA score ($r = -0.18$, $p = < 0.001$). Subgroup analysis showed a significant association between BT and mortality (OR = 1.72, $p = 0.016$) as well as HFD and mortality ($r = 0.25$, $p = 0.017$) in subjects undergoing MV following cardiac arrest (CA) ($n = 88$). No other subgroups showed a significant association in univariate or multivariate analysis.

Conclusion: In our population of patients who received MV in the ED increased BT was associated with decreased mortality. However, this association disappeared when adjusting for illness severity, suggesting that patients with higher acuity were transported from the ED faster. Importantly, increased BT was associated with mortality and fewer HFD in the subgroup of patients who underwent MV for CA. Our data suggests a possible role for prioritizing transport of CA patients from the ED. Further investigation is required to better evaluate these relationships and their clinical importance.

No, authors do not have interests to disclose

138 The Effect of Changes in Physician Shift Times and Physical Patient Coverage Areas on Resident Sign-out Burden in an Academic Emergency Department

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Objective: Emergency department (ED) staffing and patient assignments contribute to the clinical training environment during residency. Excessive patient hand offs (eg, sign-outs) at change of shift is associated with medical error and excess cognitive load, and may negatively impact resident education and wellness. We aimed to characterize subjective resident experience and objectively measure resident sign-out burden before and after implementing a physician staffing model change and a non-geographically localized patient care model in an urban academic ED. We hypothesized that staggered shift start times and non-geographical patient assignments would result in fewer resident-to-resident sign-outs.

Methods: We employed an iterative process comprising town halls, focus group discussions, and electronic surveys to develop a staggered Emergency medicine (EM) physician staffing model. Our two high-acuity adult care teams transitioned from three concurrent shifts (6a-4p, 2p12a, 9p-7a) to six staggered shifts per day (Team C: 5a-3p, 1p-11p, 9p-7a; Team D: 7a-5p, 3p1a, 11p-9a) in May 2021. Contemporaneously, we implemented a non-geographical patient care assignment model whereby physician teams care for patients outside the physician station. Prior to these interventions, we surveyed EM residents electronically regarding their perceptions related to patient sign-outs and their satisfaction with the existing ED staffing model. Residents were surveyed again at 4- and 12-weeks post-implementation. Using simple statistics and Excel® software, we analyzed survey results and metadata from the electronic health record (Epic®) for all resident patient encounters 12 weeks before and 12 weeks after the interventions. We used a "second resident" assignment data stamp as a surrogate for a patient sign-out event.

Results: Response rates for pre- and post-intervention (4- and 12-weeks) surveys were 83%, 75%, and 77%, respectively. There was no significant change in the subjective experience of resident sign-out burden after the interventions. Despite a 13.9% increase in the number of patients assigned to residents during the study period, there was a 1.84% decrease in second resident assignments ($p = 0.0002$). Second resident assignments for patients whose status was "ED Evaluation In-Process" was 1.72% lower ($p = 0.049$) post-implementation.

Conclusion: We identified a small but statistically significant reduction in resident-to-resident patient hand offs after implementing a staggered physician staffing model and a non-geographical patient care model. Resident perceptions of sign out burden were unchanged. The effect of an unexpected rise in ED patient volume during the study period on our results is unclear.

No, authors do not have interests to disclose

139 Inequities of Emergency Department Queue Jumping

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Study Objectives: Queue-jumping in the emergency department (ED) waiting room can lead to lower patient satisfaction, longer waiting time, inequity in ED access and a higher chance of leaving without being seen.

The purpose of triage is to identify patients in whom acuity necessitates being placed in a room before a patient who arrived earlier (acuity based queue jumping). In the absence of higher acuity, patients of the same acuity should theoretically be roomed in order of arrival. We aim to explore social risk factors that may be associated with violation of the "first come, first serve" queue process.

Study Design/Methods: Observational retrospective study between July 2017 and February 2020 across two EDs in a health system that see over 100,000 annual visits. Data extracted included EHR visit data such as age, race, insurance, emergency severity

index, language, zip code as well as ED operational state including time of day/week, ED occupancy, boarding, staffing. Primary outcome was incidence rate ratio (IRR) of inappropriate to appropriate queue jump over the index patient. Secondary outcome was whether or not the index patient inappropriately queue jumped other patients. Zero-inflated poison regression was performed controlling for the aforementioned patient demographics and ED operational variables at triage time, including number of beds occupied, waiting room census, and patient mixture in the waiting room (quantified using the number of distinct chief complaints in the waiting room.)

Results: 128,460 patients were included with 55.4% female and mean age 53.7 (Std Dev 19.7). 34325 patients were queue jumped by others inappropriately and 28,460 patients were queue jumped by others appropriately. Medicaid (IRR 1.06, 95% CI 1.04, 1.09), black (IRR 1.02 (1.002, 1.041), Hispanic patients (IRR 1.033 (1.01, 1.06)) and younger patients were more likely to be queue jumped by others inappropriately (IRR 0.996; 0.95 CI 0.995 – 0.997). With respect to secondary outcome, the odds of a patient doing the queue jump were lower for Medicare (OR 0.94 (0.90, 0.99)) or Medicaid (OR 0.87 (0.83, 0.91)) patients and for Black (OR 0.921(0.89, 0.96)) and Hispanic (OR 0.907 (0.86, 0.95)) patients. Sex and language were not significant.

Discussion: While triage is known to be variable and dynamic, we find consistent inequities with those insured by Medicaid, of Black race or younger all being queue jumped more often and less likely to queue jump others despite being assigned the same triage acuity. Emergency departments should seek to standardize triage processes to mitigate conscious and unconscious biases that may influence patient access to emergency care.

No, authors do not have interests to disclose

140 Factors Influencing Emergency Medical Services Burnout

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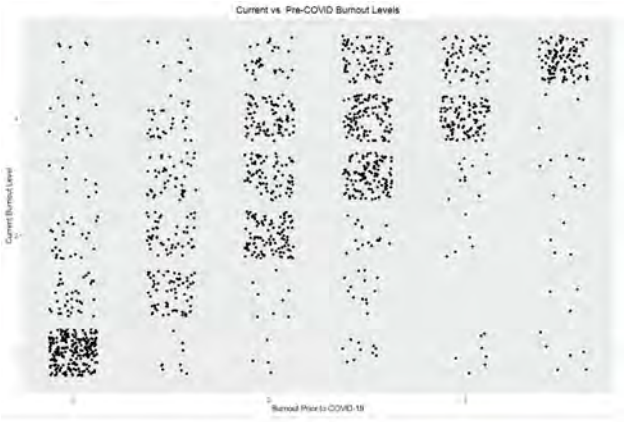
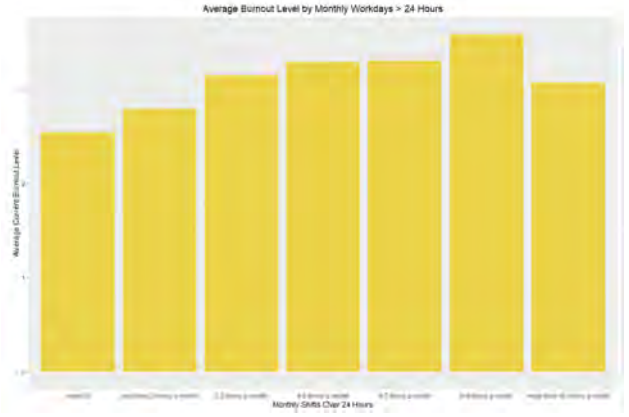
Study Objectives: Increased rates of suicide and suicidal thoughts amongst Emergency Medical Service (EMS) professionals continue to be reported in literature which has directed attention to potential causative factors. Burnout is one of the factors most discussed as being associated with this increase. There are limited studies of factors that correlate with increased burnout. Our objective was to conduct a survey of a statewide population of emergency services providers to evaluate their rate of burnout in addition to identifying both work and personal factors that may contribute to their burnout level. We also looked at self-reported burnout prior to the Covid 19 pandemic and during.

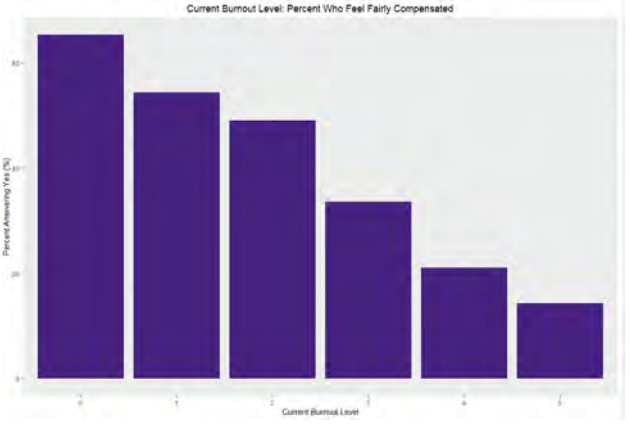
Methods: A voluntary, anonymous electronic survey was distributed to all registered emergency medical providers in the state of Louisiana through the Louisiana Bureau of EMS and the Louisiana Ambulance Alliance from 5/18/2020 to 7/24/2020. These participants represented paid and volunteer providers from a variety of systems to include; fire based, private, third city and air medical services. Data was analyzed utilizing descriptive statistics.

Results/Findings: We received a total of 1,505 responses from the 24,000 EMS providers licensed with the Louisiana Bureau of EMS. The overall response rate when factoring all active Louisiana providers was 6.09% However, the response rate increases with increasing level of provider with more 50% of responses from paramedic and advanced emergency medical technicians (AEMT) The paramedic response rate was 22.39%. The advanced EMT response rate was 28.74% The EMT response rate was much lower at 9.03%. Burnout level increased with number of years of EMS experience, increased years at current EMS provider level and more advanced levels of provider. Shift length of 12-24 hours showed the highest level of burnout (2.8, IQR 2-4). Decreased amounts of sleep correlated with increasing burnout levels. Supervisory positions correlated with higher levels of burnout. Services that did transfers only showed the lowest burnout levels (1, IQR 0-2) and those who did scene calls with and without transfer and special events showed the highest levels of burnout (2.75, IQR 2-3.5). Burnout level for pre-COVID (at 2.1) was statistically lower than burnout during COVID (2.7, p=3.15x10- 24). Burnout level pre-COVID was highest when respondents were contemplating leaving the profession and expected their profession to end within less than 1.75 years (135 individuals fall into this category). Burnout during COVID was highest not only with those two categories influencing it, but also with the perception of unfair compensation, typical shift length and years of experience. Unfair compensation had a greater impact for the COVID burnout measurement than years of expected continued service.

Conclusions: Pressures resulting in high burnout changed in this time; although contemplating leaving was still the greatest factor contributing to burnout, the second-most important decision changed from predictions about continued employment to concerns regarding fair compensation. Burnout was significantly higher during COVID and was subject to more variables than pre-COVID burnout.







No, authors do not have interests to disclose

141 Frequency of Computed Tomography When Point-of-Care Ultrasound Is Performed for Acute Flank Pain in the Emergency Department

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Study Objectives: Renal point-of-care ultrasound (POCUS) has become increasingly utilized as an initial imaging modality for patients who present to the emergency department (ED) with suspected renal colic. Despite the widespread use of POCUS for this indication, the way in which ultrasound findings impact downstream ED testing, consultation, and admission or discharge remains unclear. The aim of this study is to describe the frequency of ordering abdominal computed tomography (CT) scans in a single, academic ED, when point-of-care ultrasound is performed for suspected renal colic.

Methods: We performed a retrospective chart review of patients who presented to an academic tertiary care ED from January 24, 2020 to January 25, 2022 and underwent renal POCUS for the indication of acute flank pain. Subjects for study inclusion were identified on the ED's ultrasound workflow software, QPath E (Telexy Healthcare, Inc.) and subject's medical and visit information was accessed through the hospital's electronic medical record (Epic Systems Corporation). Best Evidence in Emergency medicine critical appraisal tools were followed for study design including: standardized abstraction forms and database, trained and audited abstractors blinded to the study hypothesis, double data abstraction, pre-determined inclusion and exclusion criteria as well as all study variables and outcomes. Group frequencies were compared using chi-squared analysis and an odds ratio was calculated with confidence intervals. Interrater reliability of data abstraction was determined by calculating a Cohen's kappa statistic.

Results: One hundred and ninety renal POCUS exams were performed for acute flank pain and 108(56.8%) of these patients had subsequent CT imaging. Ninety one (47.9%) renal POCUS exams demonstrated hydronephrosis, of which 65(71.4%) patients underwent CT scan. Ninety nine (52.1%) renal POCUS exams demonstrated no hydronephrosis, of which 43(43.4%) patients underwent CT scan (X2=15.15, p-value<0.0001, OR=3.26; 95% confidence interval, 1.78 to 5.96). Cohen's kappa for interrater reliability of data abstraction of CT scan performed was 0.968 and for POCUS read of hydronephrosis present or absent by the treating team was 0.905.

Conclusion: Following a renal POCUS for suspected renal colic, slightly more than half of patients underwent CT imaging. Interestingly, patients with hydronephrosis on renal POCUS were more likely to have CT imaging performed in the emergency department.

No, authors do not have interests to disclose

142 Emergency Department-Initiated Buprenorphine for Opioid Use Disorder: Impact on Patient Outcomes at a Community Hospital

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Study Objectives: Buprenorphine has been shown to be safe and effective in preventing the withdrawal symptoms of Opioid Use Disorder (OUD) and subsequent relapse into uncontrolled substance use. No standardized protocol currently exists for the treatment of OUD in the ED, and management has traditionally been at the discretion of the physician. This study examines the initiation of a department based protocol based on documented Clinical Opiate Withdrawal Scale (COWS) score of prescribing buprenorphine in the eligible population, and following patient outcomes over a short-term interval. (30 days from enrollment)

Study Design: This is a single center, cohort study set up with two phases. A retrospective phase which consisted of review of standard of care patients from October 2020 to January 2021, and a prospective phase where an emergency department initiated buprenorphine protocol was implemented from October 2021 to January 2022. The inclusion criteria for the buprenorphine protocol included the following: patients 18 years of age and older who meet DSM-5 criteria for OUD, patients seeking outpatient detoxification treatment with buprenorphine, and patients who were offered Peer Recovery Program (PRP) services. Exclusion criteria included: medical or psychiatric conditions requiring hospitalization, patients actively participating in methadone maintenance program, history of allergic reactions to buprenorphine. The primary outcome evaluated was readmission to the ED for OUD within 30 days of initial discharge. The secondary outcomes included: admission to an Outpatient Treatment Program through the facilitation of PRP, readmission to the ED for opioid-involved overdoses requiring naloxone administration, readmission to the ED for any reason, acceptance of PRP Recovery Specialist services, acceptance of PRP Patient Navigator Services, and follow-up with the PRP.

Results: There were 85 total patients enrolled in this study of similar race, sex, age and drug of abuse. The primary outcome of readmission to the ED for OUD within 30 days of initial discharge, was 15% in the retrospective phase and 5% in the prospective phase with a p-value of 0.17. In the secondary outcomes, 9% of patients had admission to an Outpatient Treatment Program vs. 17% in the prospective phase with a p- value of 0.32. In the retrospective group 98% of patients accepted PRP services compared to 90%, with a p- value of 0.17. In the retrospective group, 25% of patients accepted PRP Patient Navigator Services vs. 44% with a p-value of 0.11. The retrospective group included 13% of patients involved in an overdose requiring naloxone administration vs 0% with a p-value of 0.03. The retrospective group had 35% of patients with readmission to the ED for any reason vs. 13% of patients with a p-value of 0.18. Additionally 41% of patients in the retrospective group followed up with the PRP vs. 44% in the prospective group with a p-value of 1.00.

Conclusion: The ED-initiated buprenorphine protocol led to a reduction in readmissions for any reason, readmission for OUD, and overdoses requiring naloxone. There was an increase in admissions to an Outpatient Treatment Program through PRP facilitation, and acceptance of PRP Services. Limitations and low adherence rate may influence results. The next steps include continued enrollment, re-education on protocol and monitoring long term outcomes.

No, authors do not have interests to disclose

143 Understanding the Frequency of Emergency Department Utilization by Neurology Clinic Headache Patients Who Self-Report Visiting the Emergency Department for Headaches

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Study Objectives: Headache is the fourth most common cause of emergency department (ED) visits, compromising 1-3% of ED visits. The lifetime prevalence of headache occurrence is 17-25% in women and 6.5-9% in men. While chronic management of headaches is effective, it is significantly underutilized. Our outpatient neurology headache center collects patient-reported outcome (PRO) data for a variety of neurological conditions including headaches. One of the questions asks patient to self-identify their current ED utilization. Understanding the cohort of patients with self-reported frequency of ED visits for headaches together with their demographic variables may provide health systems a better understanding of patients more likely to utilize the ED. Our objective was to examine factors associated with the number of self-reported headache- related ED visits in the past year among new patients to a headache center.

Methods: This cross-sectional study included adult patients who visited the headache center at Cleveland Clinic between 10/12/2015 and 9/11/2019 and completed self-reported questionnaires. At each patient's first visit to the outpatient headache center, they responded to the question, "In the past year, how many times have you visited an emergency department or Urgent Care Facility for treatment of your headache?" Multivariable negative binomial regression analysis was used to model the number of self-reported ED visits in the past year. Demographic and clinical characteristics as well as PRO scores that were significant in univariate analyses were included in the multivariable model. Incidence rate ratios (IRR) and 95% confidence intervals (CI) were computed.

Results: A total of 6,131 patients answered the question regarding number of headache-related ED visits, of these, 2,672 (43.6%) reported visiting the ED at least once in the past year. The mean number of self-reported ED visits in the year prior to their first headache center visit was 1.61 (SD = 4.47, median = 0, IQR = 0–2, range = 0–100). Higher area deprivation index (IRR=1.05 (95% CI=1.02-1.07) per 10 units), higher body mass index (1.11 (1.04-1.18) per 10 units), not working and receiving disability (vs. working, 1.76 (1.44-2.15)), higher (worse) HIT-6 score (1.30 (1.24-1.35) per 5 points), and higher (worse) PHQ-9 score (1.13 (1.08-1.19) per 5 points) were associated with more self-reported ED visits in the past year. Older age (0.86 (0.81-0.90 per 10 years), being single (vs. married (0.87 (0.78-0.98)), cancer (0.81 (0.70-0.94)), depression (0.78 (0.70- 0.87)), and higher (better) PROMIS-GH Mental Health T-score (0.94 (0.90-0.99)) were associated with fewer self-reported ED visits in the past year. An interpretation for the HIT-6 IRR is as follows. Holding all other covariates constant, for each 5-point increase in HIT-6 score, the number of self-reported ED visits increased by 30%, on average.

Conclusion: Multiple variables in a neurology visit PRO evaluation are associated with more frequent headache-related ED utilization. PRO data can provide health systems a better understanding of headache patients' self-reported ED utilization. In addition it may allow characteristics of predictive variables that can help identify patients for possible targeted interventions.

No, authors do not have interests to disclose

144 Foundations of Emergency Medicine Resident as Teacher Experience

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Study Objectives: There are no best practices for training emergency medicine residents to be teachers. Foundations of Emergency Medicine (FoEM) is a national program that provides resident education in emergency medicine utilizing small group, case based instruction delivered by individual program faculty and residents. This study seeks to explore the use of FoEM as a resident as teacher experience.

Methods: FoEM faculty site leaders completed an online survey consisting of multiple choice, completion, and free-response items. Our study team of experienced education researchers developed the survey after literature search and piloted it prior to use. We report descriptive statistics for items with discrete answer choices. We used qualitative analysis applying a thematic approach to free-response items.

Results: 133 of 180 (74%) site leaders completed the survey. 49 (37%) programs utilize resident instructors for FoEM. For programs that have resident instructors, 11 (22%) allow PGY-2s, 42 (86%) allow PGY-3s, and 12 (24%) allow PGY-4s to teach. 30 (61%) programs have all residents in eligible PGY classes serve as instructors and 8 (16%) have only eligible residents who express interest instruct. The most common FoEM courses that residents taught were FoEM I (45/49; 92%) and FoEM II (26/49; 53%). The frequency that residents served as FoEM teachers varied amongst programs; 10/49 reported residents "rarely" served as instructors, 9/49 "occasionally", 7/49 "frequently", 11/49 "almost every time", 10/49 "every time we use FoEM". 24/49 (49%) site leaders reported that faculty directly supervise residents teaching FoEM "almost every time" or "every time". Faculty perceived the following advantages to using FoEM as a resident as teacher experience: Consistent quality of education for learners (20/49), minimal preparation work for resident teacher (29/49), reduction in need for faculty instructors (30/49), reinforcement of core content knowledge for resident teachers (44/49), structured format of material (35/49). Challenges to using FoEM as a resident as teacher experience included: difficult to incorporate faculty oversight (17/49), challenge to provide feedback on teaching (20/49), prepared materials limit creativity for resident teachers (4/49), variable instruction given by resident teachers (33/49). Site leaders supported using FoEM as a resident as teacher experience and recommended dedicated content on instructional delivery as well as feedback from faculty on teaching performance as ways to improve the FoEM resident as teacher experience.

Conclusion: FoEM can be utilized as a resident as teacher experience. Site leaders have identified strengths of this program and opportunities for growth. The results from this study can inform the use of FoEM as a resident as teacher experience at all programs.

No, authors do not have interests to disclose

145 External Validation of the Non-Ischemic Troponin Rule Out in Acute Heart Failure (NITRO-AHF) Decision Instrument for Acute Myocardial Infarction or Revascularization

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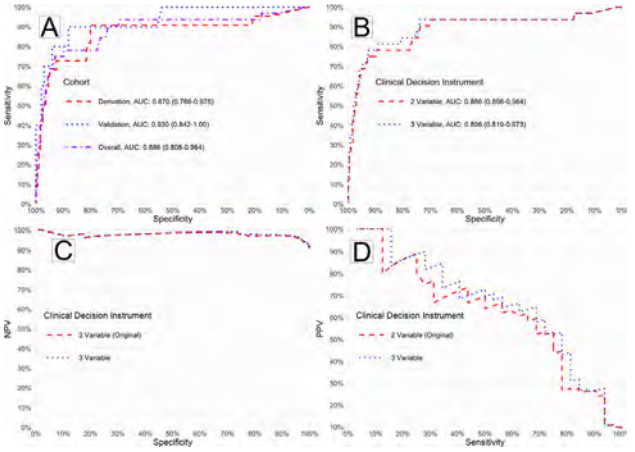
Objectives: Non-ST elevation acute myocardial infarction (AMI) complicates around 10% of emergency department (ED) presentations for acute heart failure (AHF), while non-ischemic troponin elevation occurs in over 40%. We had two primary objectives: 1. Validate the recently-derived 2-variable non-ischemic troponin rule out in AHF (NITRO-AHF) clinical decision instrument (CDI) for predicting AMI or 30-day revascularization, and 2. Test whether addition of serial troponin measurement adds value to the original CDI.

Methods: This was a pre-planned secondary analysis of 2 previous prospective studies which enrolled diagnostically- adjudicated AHF patients in 5 EDs at 2 different institutions from 2017-2021, excluding those with STEMI or shock. Patients were divided a priori into derivation and validation cohorts and the primary outcome of AMI or revascularization within 30 days was adjudicated by 2 blinded investigators applying the 4th Universal Definition of MI. The original 2-variable CDI (1. Initial ED troponin and 2. presence/absence of occlusion MI (OMI) ECG criteria) was tested using out-of-sample prediction on the external validation cohort compared to the derivation by receiver operating characteristic area under the curve (ROC-AUC). A newly derived 3-variable model was created from the combined validation and derivation cohorts: the original 2 variables plus the maximum absolute change on serial ED troponins (max-Delta-cTn). ROC-AUC, negative and positive predictive values (NPV, PPV), and precision-recall AUC (PR-AUC) were calculated.

Results: The derivation cohort included 223 patients and 22 events (10%) while the validation cohort included 115 patients and 10 events (9%). 39/115 reported chest pain, which was neither sensitive (38%) nor specific (66%) for AMI. The 2-variable CDI showed higher AUROC = 0.930 (95% CI: 0.842-1.00) in the validation cohort than in the prior derivation (AUROC 0.870 {0.766-0.975}, Figure Panel A). In the combined cohort (Figure Panel B), the newly derived 3-variable CDI had slightly higher AUROC (0.896 {0.819-0.973}) compared to the newly validated 2-variable model (0.886, {0.808-0.967}). The 2- and 3-variable models yielded >99% NPV at specificities as high as 69% (Figure Panel C), with 0.776 PR-AUC in both (Figure Panel D). Probability of the primary outcome <3% was observed at 1.3x the troponin upper limit of normal in the 2-variable CDI, and 1.5x in the 3 variable CDI.

Conclusion: We externally validated a highly accurate 2-variable CDI for distinguishing acute ischemic and non-ischemic troponin elevation in AHF. Addition of max-Delta-cTn to the NITRO-AHF CDI may allow detection of non- ischemic elevations at even higher troponin values.



No, authors do not have interests to disclose

146 Exploring the Impact of Leave and Return to Work Policies on Workplace Lactation for Women in Emergency Medicine

Prendergast N, Sebok-Syer S, Moulton K/Stanford University, Palo Alto, California, US

Objective: Breastfeeding has profound health benefits for both mothers and infants. Because of this, the American Academy of Pediatrics recommends exclusive breastfeeding for the first 6 months of life and, in conjunction with the introduction of solid food through the first year. Despite recommendations, medical professionals only reach these goals roughly 50% of the time and 37% fall short of their personal goals. Early return-to-work requires both increasing lactation requirements and extended time away from one's infant, which may contribute to early cessation breastfeeding. Our study explores variation in emergency medicine (EM) health care workers return-to-work and clinical scheduling and is guided by the following aims: Understand social process and behaviors associated with maternity leave planning and effect on return-to-work and lactation for health care workers in the emergency department (ED) Identify barriers and supports for supporting workplace lactation, wellness, and maternal health. Examine policies for maternity leave and return-to-work scheduling that facilitate women reaching their desired goals.

Methods: Setting: Stanford University, Emory University. Participants: Individual interviews were conducted with 43 individuals who returned to work after giving birth within the last 3 years. Purposive sampling followed by snowball sampling was used to recruit participants.

Design: A qualitative study using constructivist grounded theory methodology was employed and selected because we viewed return-to-work and workplace lactation as social processes. Constant comparative analysis was performed utilizing data from individual interviews across three analytical stages of coding: initial, focused, theoretical. Initial line-by-line coding was done by two investigators to identify major themes. Following initial analysis, important themes were explored in subsequent interviews. Following development of the coding scheme, interviews underwent focused coding transitioning from categorical to conceptual ideas to provide guidance on ED return-to-work practices and patterns, while considering existing policies and social constructs. Theoretical coding was utilized to explore relationships and analytical memos to reflect researcher's insights and questions regarding these codes.

Results: The goal was to create a conceptual model of barriers, supports and participant guided recommendations for improvement of return-to-work policies and supplement the initial study to expand regarding barriers to workplace lactation, and provide further supports, in addition to solutions to the complex social process that face female ED workers. Once coding was completed and themes were identified: return-to-work shift arrangements, culture surrounding leave, and policies and departmental supports, one final review of all transcripts was done to identify the average leave time (by departmental role) and participants ideal return-to-work.

Conclusion: Health care workers in ED settings have an average return-to-work of 16 weeks, but desire closer to 25. Trainees have the least amount of leave time and require additional considerations for returning-to-work. Abbreviated leave times were identified as a significant barrier to continuation of workplace lactation in the ED and some mitigating approaches could include, return-to work policies that provide no nightshifts or no greater than three shift in a row for six weeks after returning to work.

Role	Number of Participants	Average leave	Ideal Return to Work
Attending	16	14	21
Trainee	7	11	22
Midlevel	3	18	26
Nurse	5	28	36
Total	**31**	**16**	**25**

No, authors do not have interests to disclose

147 When, What and How Frequently Do Patients Electronically Access Their Emergency Department Records After Discharge?

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Study Objectives: With the wide adoption of electronic health records (EHR), the 21st century CURES Act aimed to improve patient access and to their personal health information. This "open notes" initiative includes patient access to physician notes and other aspects of the medical record, including those from emergency department (ED) visits. We sought to assess how frequently patients access their ED record, what parts of the record are viewed, and the timing of access following ED discharge.

Methods: We conducted a multi-center retrospective review of all patients seen and discharged from 2 EDs (urban academic hospital and suburban quaternary medical center, combined census approximately 80,000 visits annually) over a 12-month period (12/1/2020-11/30/2021). Both sites utilize the same EMR (Epic) in which patients could access their EHR through an electronic patient portal (MyChart). We reviewed patient records for any patient viewed their ED records following discharge. We collected data regarding the frequency and timing of electronic views, as well as what parts of the medical record (excluding discharge instructions) that were viewed. 95% confidence intervals for proportion are provided.

Results: During the 12-month study period, there were 57684 visits discharged from the ED. These visits generated 619877 note types that could be viewed by patients electronically after discharge, of which 65920 (10.6%, 95% CI: 10.5%-10.7%) were accessed by patients. These visits generated 131081 note types that could be viewed by patients electronically after discharge, of which 42590 (32.5%, 95% CI: 32.2-32.7%) were accessed by patients. The most frequent note types viewed were physician notes which included: ED Provider Note 26.3% (95% CI: 25.3%-27.4%) within 24 hours and 35.0% (95% CI: 33.8%-36.1%) 1 to 7 days, ED MD Note 28.9% (95% CI: 27.2%-30.5%) and 36.0% (95% CI: 34.3%-37.7%) and ED EKG Interpretation 31.28% (95% CI: 28.7%-33.7%) and 33.9% (95% CI: 31.3%-36.4%). Specialty Consult notes were viewed 29.3% (95% CI: 26.9%-31.8%) and 37.2% (95% CI: 34.6%-39.8%). Overall, 11.8% (95% CI: 11.5%-12.1%) of views occurred in the first 24 hours and 35.3% (95% CI: 34.8%-34.7%) within the week of the ED visits.

Conclusion: In our study, patients accessed their ED record electronically most frequently to view Provider type notes that included ED Provider notes, ED MD Notes, EKG Interpretations, and specialty Consults. A small portion occurred within 24 hours of discharge, nearly half occurred within a week after the ED visit.

No, authors do not have interests to disclose

148 Accessibility in the Emergency Department for Patients With Disabilities: A Qualitative Study

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Study Objectives: The objective of this study was to identify barriers in the emergency department (ED) which affect the provision of care for individuals living with a broad range of disability such as visual impairment, hearing impairment, physical disability or cognitive disabilities.

Study Design/Methods: Semi-structured interviews were conducted via video call with 12 participants living with varying degrees of physical, visual and cognitive disabilities who received care in local emergency departments within 18 months prior to the beginning of the study. Demographic information was collected by a voluntary survey conducted at the end of the video call. Participants were recruited through local patient advocacy groups, advertisements on social media outlets and through contacts with local providers. Interviews focused on understanding the patients' experiences and perspectives during their ED visit while identifying personal, environmental and systemic barriers to receiving adequate care in the ED. Interviews were audio recorded and transcribed. A generative coding approach was used, with a codebook created from preliminary readings of the transcripts and modified with additional reading of the transcripts. Each transcript was collaboratively coded by two authors and data was analyzed in order to generate overlying themes and to identify meaningful changes to be made in the emergency department.

Results: All participants in this study were interviewed by video call. Participants had a mean age of 62 years old, with 10 of the 12 participants identifying as female. 4 of 12 participants identified as African American, and 8 of 12 participants identified as White. Several of the participants interviewed lived with more than one disability and were encouraged to speak to the entirety of their experience. Five major themes arose from interviews with the 12 participants. These themes included, 1) the need for improvements to multiple areas of staff training when caring for patients with visual impairments and physical disabilities; 2) the importance of electronic delivery for after visit summaries (AVS) for individuals with cognitive and visual disabilities; 3) the importance of mindful listening and patience to communicate effectively and to provide better care; 4) the need for increased hospital greeters and volunteers to help those with disabilities navigate the hospital and meet basic needs; and 5) the need for comprehensive training with both out-of-hospital and hospital staff around assistive devices and services, such as wheelchairs and service animals.

Conclusion: This study conducted individualized interviews to identify key areas of intervention to improve the emergency department environment to ensure accessibility and inclusivity for all patients. Implementing specific training, policies, and infrastructure changes may improve the experiences and safety of those with disabilities.

No, authors do not have interests to disclose

149 Patterns of Fluoroquinolone Use in the Emergency Department 2009 - 2019

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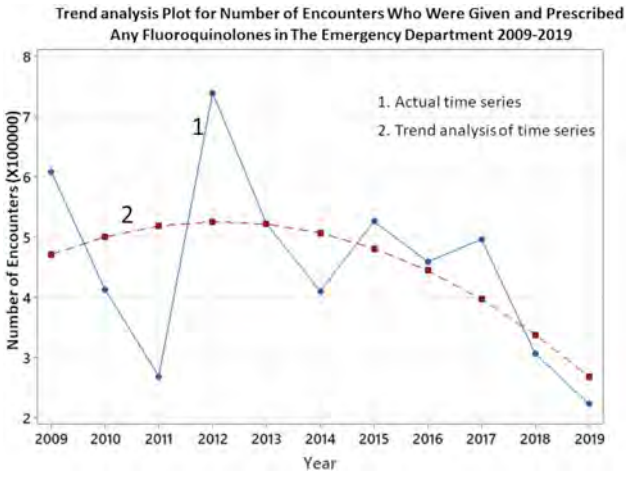
Study Objectives: Fluoroquinolone antibiotics, with high concentration in the prostate and lung tissue, are excellent candidates for urinary and respiratory infections. However, since 2008, their usage might have been declining, potentially secondary to adverse effects, per warning by the US Food and Drug Administration. This study aims to examine the trend in fluoroquinolone prescribing in emergency departments (ED) from 2009-2019.

Methods: Data were obtained from the National Hospital Ambulatory Medical Care Survey (NHAMCS) between 2009 and 2019. Adult ED visits who were given

fluoroquinolone in the ED or received a prescription were included. We used bivariate analyses to compare the patterns of ED order of fluoroquinolones between sex, age groups, regions, patient's 72-hour ED returns. Time series analysis was used to assess the trend of annual number of nationwide patients who were given and prescribed fluroquinolones in the ED.

Results: Our weighted data represented 1.5 billion national encounters. There was a total of 831 million (55%) female and 675 million (45%) male. There was a total of 4.9M (0.32%) encounters who were both given AND prescribed any fluoroquinolone in the ED. Among these encounters, 2.9M (60%) female and 2.0M (40%) males (difference 20%, 95% CI 6-34, P = 0.007). The majority of fluoroquinolone was levofloxacin (3.3M, 66%) and ciprofloxacin (1.6M, 33%). There was a trend toward more giving and prescribing fluoroquinolone to groups with higher ages. Age group >65 was the largest group to receive fluroquinolone (1.6M, 37.7%), age group 45-64 years was second largest group with 1.6M (32.5%) encounters. The third highest group of fluroquinolones was 35-44 years, with 651,545 (13%). Comparing to the >65-year group, the group < 15 years was the smallest group (100,403, 2%, difference 31% (95% CI 21- 41, P < 0.001). For those who were given and prescribed any Fluoroquinolone, 150,560 (3%) encounters returned to the ED within 72 hours, compared with 88% who did not return (difference of 85% (95% CI -92, - 77, P < 0.001), and 145 million (9%) unknown patients' return status. The time series analysis over the 10-year study showed the highest peak for the number of encounters who were given and prescribed in 2012, with 738,284 (15%) encounters among the total amount of those who received fluoroquinolone. In 2016, when the Food and Drug Administration announced the strongest "black- box" warning, there were 458,301 (9.2%) patients given fluroquinolone, this number increased to 494,771 (10%) in 2016, before declining to 304,536 (3%) in 2018, and 222,276 (2.2%) in 2019 respectively. The difference between 2019 and the highest peak in 2012 was -11% (95% -20 to -3, P = 0.007). Similarly, the difference between 2019 and the peak of giving and prescribing fluroquinolone after "black-box warning" was -6% (95% CI -13 to 1, P = 0.094). The quadruple model which best fitted the time series of annual encounters, suggested that patterns of giving and prescribing fluoroquinolones did not sharply decline until 2017.

Conclusion: Among all the national encounters, only 0.32% were both given and prescribed fluoroquinolone in the ED. Among patients who received fluoroquinolone, there was an upward trend toward higher number of giving and prescribing fluoroquinolones to patients in higher age groups.



No, authors do not have interests to disclose

150 The Rate and Risk Factors Associated With Short-term Unplanned Visit With Admissions After Emergency Department Discharge: A Systematic Review and Meta-Regression Analysis

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Introduction: Unplanned return to emergency department (ED) with a hospitalization shortly after ED discharge, or bounce-back admissions is a commonly used quality metric and may indicate missed diagnoses or management of the presenting illness, inadequate ED care, or insufficient outpatient follow-up after discharge. There are several original studies evaluating the rate and risk factors for bounce back admission, however to our knowledge a meta-analysis evaluation the overall rate and pooled risk factors of bounce back admission is scarce. The aim of this study is to pool the rate of and risk factors for 72-hour bounce back admission to the ED.

Methods: Following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, we searched four electronic databases (Medline, Embase, Web of Science and Cochrane) for studies reporting on the rate and factors associated with 72-hour bounce back admission. The original studies including adult patients (above age of 18) and with no language restrictions were included in this systematic review. Study and patient characteristics, the setting of emergency department (urban vs rural, academic vs non-teaching hospital), the rate readmission, admission to critical care unit or a surgical procedure, risk factors for revisit with admission were collected. Newcastle-Ottawa Scale (NOS) was used for quality assessment of the included studies and only high-quality studies defined by NOS score of 6/9 or higher included in data synthesis. All data synthesis and quality assessment were done by two independent researcher and disagreement resolved by involving a third reviewer. We used subgroup analysis and remove one studies to address heterogeneity among included studies and due to significant unresolved heterogeneity, a random effect meta-analysis was used to pool the data. We used meta-regression meta-analysis in order to pool Odds Ratio for each proposed risk factors.

Results: A total of 14 studies involving over 40 million patient visits identified and reviewed for this study. The majority of studies (9/12) were multi-center ED and urban setting and the overall rate of unplanned 72 hours ED visit with admission was 3.2% (SD: 1.2%). The rate of ICU admission was 14% (3%) of the admissions and there was 8% (3%) admission with a surgical procedure. The mean age of patient among included studies were 64 (14), the majority were man 59% (+- 7%) and the most common presenting compliant with admission was abdominal pain (46%, +- 9%) (94.5%). The significant risk factors for admission were leaving against medical advice (Pooled OR 5.7), ambulance-transport at return visit (Pooled OR = 3.68), age above 65 (Pooled OR = 2.44), being man (Pooled OR = 1.44), and homelessness (pooled OR 1.32) were among the significant risk factors.

Conclusion: We found approximately 3.2% of all discharged ED visits resulted in an unplanned ED visit with admission. The population at risk included elderly, homeless, being man, and abdominal pain. Our findings can direct quality improvement measures on high-risk individuals and setting to prevent delays care and possible adverse outcomes.

No, authors do not have interests to disclose

152 Pulmonary Embolism in Patients With Cancer: Predicting 30-day Mortality

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Study Objectives: Pulmonary embolism (PE) remains one of the most common causes of morbidity and mortality among patients with cancer. Several cancers, including gastric, lung, pancreatic, and lymphoma, are known to increase coagulability, while others may have negligible effects on the coagulation cascade. Scores exist to risk stratify patients post-PE, many of which list "any cancer history" as a significant risk factor. To date, there are no validated PE risk stratification tools that take a more nuanced look at cancer, to aid clinicians in disposition decisions. Our objective is to evaluate several clinical and historical factors among cancer patients with PE, to better understand the risk of 30-day mortality.

Methods: We conducted a retrospective cohort study at 2 academic EDs in Southern California to assess the risk of mortality among patients with active cancer diagnosed with PE between 6/1/12 – 6/1/19. We recorded demographics as well as past medical history, vital signs, cancer type, presence of metastatic disease, eastern cooperative oncology group (ECOG) performance status, as well as 30-day mortality. We performed univariate logistic regression to assess for potential contributors to mortality, which informed a subsequent multivariable logistic regression. We considered an alpha $<.05$ significant. Descriptive statistics are reported.

Results: We identified 202 cancer patients with PE during our study period. The cohort was 51% female, 59.4% Non- Hispanic White, 18.3% Hispanic, 6.4% Black and 7.9% Asian/Pacific Islander, with a median age of 60. The most common cancer was lung (15.8%, n=21), followed by breast (10.4%, 21), pancreatic (10.4%, 21), colorectal (9.9%, 20), and head/neck (9.4%, 19). On univariate regression we found that metastatic disease ($p=0.04$), performance status ($p=.003$), tachycardia (0.039), a high burden of chronic disease (0.019), and hospitalization within 30 days ($p<.001$) were all significantly associated with mortality. When assessing these factors on multivariable regression, after adjusting for age and sex, performance status ($p=.017$) and hospitalization within 30 days ($p=.002$) remained significant. Of note, cancer type was not found to be a significant factor.

Conclusion: We identified several factors on univariate analysis that appear contributory to death, which may be targets for future study. On multivariable analysis, however, only 2 factors remained significant (performance status and recent hospitalization), both of which perhaps underline the importance of patient mobility in the generation of venous thromboembolism, as well as subsequent mobility/mortality.

No, authors do not have interests to disclose

153 Risk Factors for Human Immunodeficiency Virus Infection at a Large Urban Emergency Department

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Study Objectives: In 2019, the United States Preventative Services Task Force (USPSTF) released updated guidelines recommending HIV screening in all individuals aged 15 to 64 years and all pregnant females. In the current study, we aimed to identify risk factors for HIV infection in an emergency department (ED) population.

Study Design: We performed a post-hoc risk factor analysis of ED patients $\geq$18 years who were screened for HIV between November 28, 2018, and November 27, 2019, at a single urban, quaternary referral academic hospital. Patients were screened using HIV antigen/antibody testing and diagnoses were confirmed using HIV-1/HIV-2 antibody testing. The outcome of interest was the number of positive HIV tests. Multiple logistic regression models were used to identify risk factors associated with HIV positivity.

Results: 14,335 adult patients were screened for HIV (mean age: 43 $\pm$ 14 years; 52% female). HIV seroprevalence was 0.7%. Independent risk factors for HIV positivity included male sex [aOR 3.2 (95% CI 1.7, 5.8)], African American race [aOR 1.6 (95% CI 0.9, 2.9)], Hispanic ethnicity [aOR 2.3 (95% CI 1.0, 5.4)], undomiciled housing status [aOR 3.1 (95% CI 1.8. 5.4)] and history of illicit drug use [aOR 2.2 (95% CI 1.2, 4.0)]. Relative to the White race, the Asian race was a protective factor for HIV infection and was co- linear with a negative HIV status.

Conclusion: The study institution ED services a high-risk population with regards to HIV infection. These data support universal screening of ED patients for HIV. Risk factor profiles could improve targeted screening at institutions without universal HIV testing protocols.

No, authors do not have interests to disclose

154 Gamification of Point-of-Care Ultrasound: Are Students Learning?

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Background: While gamification of point-of-care ultrasound (POCUS) is well received by learners, very little is known about the knowledge gained from material taught during these events. We set out to determine if a POCUS gamification event improved knowledge of interpretation and clinical integration of POCUS.

Methods: This was a prospective observational study of fourth year medical students who participated in a 2.5-hour POCUS gamification event consisting of 10 stations. Each station had one to two learning objectives associated with the content taught. Students completed a pre-survey and knowledge assessment, then participated in the gamification event in groups of two to four per station, and subsequently completed a post- survey and knowledge assessment. Differences between pre- and post-session responses were matched and analyzed using Wilcoxon Signed Rank test and Fisher's Exact tests.

Results: We analyzed data from 186 students with matched pre- and post-event responses; 160 (86%) students reported no to very little prior POCUS experience. Most students were going into internal medicine (18%), pediatrics (14%) and emergency medicine (14%). Knowledge assessment scores significantly improved from pre- to post-workshop, 68% vs 79% ($p=0.04$). Self-reported comfort with image acquisition, interpretation, and clinical integration all significantly improved from pre- to post- gamification event ($p<0.001$).

Conclusion: In this small study, gamification of POCUS, with clear learning objectives, led to improved student knowledge of POCUS interpretation, clinical integration, and self-reported comfort with POCUS.

Yes, authors have interests to disclose

Disclosure: Vave Healthcare and 3rd Rock Ultrasound

Consultant/Advisor

Vave Healthcare and 3rd Rock Ultrasound

155 Assessment of Bystander Cardiopulmonary Resuscitation Comfort Level in Out-of-hospital Cardiac Arrests Amidst An Ongoing Pandemic

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Study Objective: Bystander cardiopulmonary resuscitation (CPR) plays a crucial role in maximizing survival of out-of-hospital cardiac arrests. Little is published regarding the perceived risk of how contagious respiratory infections affect comfort level of performing CPR. This study aims to evaluate the difference in willingness to perform CPR before and during the COVID-19 pandemic.

Methods: The survey was administered in the emergency department at an urban tertiary care teaching hospital. Participants were patients and visitors between 18 and 89 years old. Individuals who were critically ill, had active ongoing management, or were unable to consent were excluded. Factors collected included sex, age, status as a health care worker/first responder (HW/FR), belief that CPR must include mouth-to- mouth breathing, frequency of wearing mask in public, degree of concern about contracting infectious diseases during CPR, and willingness to perform CPR in different scenarios on a 1-10 Likert scale. The IRB deemed this study as exempt.

Results: Of 202 individuals surveyed, 53 were HW/FRs. 115 individuals believed that CPR must include mouth-to-mouth breathing (Bl), while 84 did not (non-Bl). There were significant differences in the mean Likert scale to perform bystander CPR before COVID-19 compared to during the pandemic ($p < .0001$), both among the non-HW/FRs ($p < .0001$) and the HW/FRs ($p = .0122$) (Table 1). A significant

difference in mean willingness to perform bystander CPR before vs. during the pandemic was present in both Bl ($p < .0001$) and non-Bl ($p < .0001$) (Table 1). A higher concern of contracting illness during CPR was statistically significantly associated with less willingness to perform bystander CPR ($p = .0005$) (Figure 1).

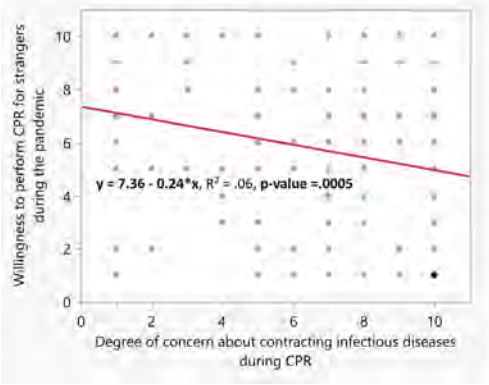
Conclusion: Both HW/FRs and non-HW/FRs are less willing to perform bystander CPR during the pandemic. Concern about contracting infectious diseases during CPR is associated with less willingness to perform bystander CPR.

Table 1: Willingness to perform CPR for strangers before and during the pandemic

	Before Pandemic	During Pandemic	p-value
Combined (Mean- 95% CI)	7.34 (6.93, 7.75)	5.80 (5.33, 6.27)	**< 0.0001**
HW/FR (Mean- 95% CI)	7.72 (6.88, 8.56)	6.11 (5.17, 7.05) (*)	**0.0122**
Non-HW/FR (Mean- 95% CI)	7.18 (6.71, 7.66)	5.66 (5.11, 6.21)	**< 0.0001**
Bl (Mean- 95% CI)	7.20 (6.66;7.77)	5.50 (4.88, 6.12)	**< 0.0001**
Non-Bl (Mean- 95% CI)	7.48 (6.84; 8.11)	6.15 (5.42, 6.89) (*)	**0.0075**

(*): 95% CI overlap, but significantly different under t-test

Figure 1: Relationship between willingness to perform bystander CPR during the pandemic & concern about contracting infectious diseases during CPR



No, authors do not have interests to disclose

156 Dissemination and Implementation of Age-Friendly Care and Geriatric Emergency Department Accreditation at Veterans Affairs Hospitals

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Study Objectives: In 2018, the US Department of Veterans Affairs (VA) Offices of Emergency Medicine and Geriatrics & Extended Care partnered to improve acute, unscheduled care for older Veterans. The goals of the partnership were to create a VA core team to promote best geriatric emergency care practices via standardization, education, and Geriatric Emergency Department (ED) Accreditation (GEDA) through the American College of Emergency Physicians. The objective of this abstract will be to describe the current progress of GED implementation and dissemination at the VA.

Study Design / Methods: This is a descriptive summary of Veterans seen in VA EDs from January 2018 - March 2022 with data from the VA Corporate Data Warehouse. We collected GED implementation data by extracting rates of screening for documented geriatric assessments, health care utilization patterns, and demographic data from ED visits. We compared EDs with and without GED implementation (non-GED versus Level 3 to 1 (L1 = highest GEDA implementation)) based on date of accreditation [RLCD1] application submission or approval. Standardized GED assessments in the electronic health record did not begin until 2019[RLCD2], although some sites collected local data on GED programming in 2018.

Results / Findings: During this implementation phase, 1.07 million unique Veterans 65+ years in age made 4.08 million VA ED visits. Over 40% of these visits were made atoccurred in a VA ED seeking or receiving GEDA. Forty percent of VA EDs (44/111) began GED initiatives and applied for or received GED accreditation (4 as Level 1, 7 as Level 2, and 33 as Level 3); 28 (25%[MCM([3] [RLCD4]) of VA ED are now GED accredited. The nationally standardized GED assessments include the Identification of Seniors At Risk (ISAR), Delirium Triage Screen (DTS), Brief Confusion Assessment Method, Mini-Cognitive assessment, a falls risk screen, Activities of Daily Living, and Caregiver Burden screen. The most heavily adopted screens completed in GEDs were the ISAR and DTS. ISAR screening documentation continuously increased, especially at Level 1 GEDs, (from 0% in 2018 to 57.5% of Veterans screened in 2022). The DTS screening documentation also increased at Level 1 GEDs (from 0% in 2018 and 2019 to 23.7% in 2022). There were no differences by admission rates when comparing Level 1 GEDs versus non-GEDs (27.9% vs. 27.3%; p=0.18). GEDs, however, had lower ED revisit rates at 24 hours (1.5% vs. 2.1%), 72 hours (4.0% vs. 5.3%), 30 days (23.3% vs. 25.1%), and 90 days (33.8% vs. 36.3%) compared to non-GEDs (all $p<0.01$) [RLCD5].

Conclusion: The VA is the country's largest integrated health care system implementing and disseminating geriatric emergency care. Adoption of geriatric-focused screenings has steadily increased over time as more facilities pursue GEDA. With 40% of its EDs seeking GED accreditation, and 25% sites achieving this (during the COVID pandemic), the VA approach to implementation and spread of geriatric emergency care can be a model for other health care systems.

No, authors do not have interests to disclose

157 Outpatient Management of Spontaneous Pneumothorax With Thoracic Vent: A Retrospective Analysis of a Device Specific Treatment Modality

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Study Objectives: This study retrospectively evaluated patients treated for a spontaneous pneumothorax (SP) and subsequently discharged from the emergency department (ED) with a thoracic vent (TV). It identified the proportion of treated patients who return to the ED for unscheduled care within 72 hours of the initial visit. It further characterized the reasons for the patients return to the ED, description of any procedures, and disposition. Given the paucity of literature on this specific ambulatory device, TV will be evaluated for its safety and efficacy as a treatment option for outpatient management of spontaneous pneumothorax.

Study Design/Methods: Data was obtained by querying the HealthConnect database from Kaiser Permanente San Diego ED sites from January 2008 through December 2021. The query selected patients who had a diagnosis of spontaneous pneumothorax and were subsequently discharged home on the initial ED visit. Retrospective chart review was then performed, and all patients who were treated with a TV were identified. Additionally, unplanned repeat ED visits within 72 hours following the initial discharge were identified. This group of patients was evaluated for multiple characteristics including chief complaint on the repeat visit, subsequent interventions performed, and the ultimate disposition. Three different physicians participated in data collection and chart review, and initially reviewed the same randomly generated 10% of patient encounters using a standardized data collection tool. Thus, a certain degree of inter-rater reliability was ensured and calculated with a Krippendorff's alpha of 0.933.

Results/Findings: A total of 238 patients age 14 or older were diagnosed with a SP and subsequently discharged from the ED. 151 of those patients, 63.4%, were discharged with a TV in place, as 83 patients (34.9%) had no intervention, and 4 patients (1.7%) were discharged home with a pigtail catheter and Heimlich valve. 77% were male and the median age was 24. The primary outcome, the percentage of TV patients who returned to ED within 72 hours for unscheduled follow up care, was 30 out of 151 patients, 19.9% [95% confidence interval (CI): 13.5 - 26.3%]. The most common chief complaints on repeat visits were TV complication or bleeding, 10 patients (33%), chest pain, 9 patients (30%), shortness of breath, 6 patients (20%), and back pain, 3 patients (10%). 14 of the 30 patients (47%) required admission to the hospital on the repeat visit. 13 patients (43%) required a second procedure on their repeat visit, either in the ED or in the hospital, including surgical tube thoracostomy (4), pleurodesis (4), repeat TV (3), and Interventional Radiology guided pigtail catheter (2).

Conclusion: These results demonstrate that the use of a TV is a safe and efficacious treatment modality for SP for patients being discharged home. In general, SP is not a condition easily cured regardless of type on intervention, as prior studies have measured the recurrence rate to be 32%. Given this, outpatient management, while appropriate for some patients, should not be viewed as definitive, as patients require close outpatient follow up and the possibility of future procedures. When compared to other studies, the findings of this research show that the failure rates of TV are comparable or better in relation to other ambulatory small bore chest tubes with Heimlich valves, as the literature suggests a failure rate anywhere from 18% to 35%.

No, authors do not have interests to disclose

158 The Immediate and Long-Term, Follow-Up Impact of a Brief Educational Intervention on Attending Physicians in the Placement of Ultrasound-Guided Intravenous Catheters

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Study Objective: The purpose of this study is to measure the immediate impact, and eight-month follow-up retention effect, on attending physician comfort during ultrasound guided intravenous catheter (USIV) placement, following a fifteen-minute, hands-on, one-on-one educational intervention.

Methods: This is a prospective, experimental, within-subjects design with an eight-month follow-up, in which participants self-selected to participate, examining the impact of a fifteen-minute, hands-on, educational intervention on twenty-seven emergency medicine attending physicians (N = 27) who practice at a tertiary academic facility. Participants provided the number of years they have been practicing, presence of US training during residency, and a pre-intervention assessment (5-point Likert scale) on comfort level of US- guided IV placement. The participants then underwent a fifteen-minute, one-on-one, hands-on, educational workshop with an ultrasound trained faculty member. The participants completed an immediate post- intervention assessment. Finally, an eight-month follow-up was conducted in which participants had to demonstrate the USIV technique and repeat the survey to determine any residual impact of the educational intervention.

Results: The study group consisted of twenty-seven participants (N = 27) with a mean of 10.2 years of practice (SD = 8.6). A paired-samples t-test was used to determine if there was a statistically significant difference in the scores reported by participants with respect to comfort level when placing ultrasound guided intravenous catheters. The educational intervention resulted in a statistically significant increase in scores M = 0.44, 95% CI [0.742, 0.147], t(26) = 3.075, p = .002, d = 0.59. At the eight-month follow-up assessment, participants retained benefit with mean scores 0.27 points above baseline. Additionally, a multiple regression was run to understand the effect of years of training and presence of US training during residency on improvement of scores. When controlling for presence of US training during residency, the prediction equation for improvement in scores was: improvement in score = 0.116 + (0.048 x years of experience). Years of experience significantly predicted increased impact of the education intervention, F(2, 24) = 9.19, p = .001, accounting for 43% of the variation in scores with a medium size effect (adjusted R2 = 38.7%).

Conclusion: This study examined the impact of a brief educational intervention on attending physician comfort during USIV placement. The intervention had a statistically significant impact with a retained beneficial effect after an eight-month period. Attending physician years of experience significantly predicted an increased impact of the intervention. This may be due to more limited incorporation of ultrasound during training or differences in practice patterns. Emergency departments may consider incorporating brief, regularly occurring, hands-on training sessions to maintain the ultrasound-guided IV placement skillset of practicing emergency physicians.

No, authors do not have interests to disclose

159 Ketamine Use for Buprenorphine-Precipitated Opioid Withdrawal: A Case Series of 10 Patients

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Study Objectives: To describe the characteristics and clinical outcomes among ED patients with buprenorphine precipitated withdrawal who were treated with ketamine. Buprenorphine precipitated opioid withdrawal is uncommon, but concerning for patients and clinicians. It is vital to determine effective management for this clinical phenomenon. Ketamine is an NMDA receptor antagonist and a potent analgesic which reduces opioid withdrawal symptoms independently of mu opioid receptor binding, which allows it to act synergistically with buprenorphine for relief of withdrawal symptoms. Methods (including design, setting, type of participants): This was a retrospective case series of ED patients treated under a precipitated withdrawal protocol that included high-dose buprenorphine and ketamine between 04/2021- 04/2022. Encounters were identified using the electronic medical record. We describe patient demographics; substances used and time of last use if known; COWS (Clinical Opiate Withdrawal Score) throughout encounter; buprenorphine dosage administered; time to precipitated withdrawal; ketamine dosage administered; subsequent suboxone administered; other supportive medications given; time to safe discharge; support services given; and follow up.

Results: The 10 patients in this case series had withdrawal precipitated in the setting of buprenorphine use; 3/10 patients presented to care in precipitated withdrawal after use of buprenorphine in the community and 7/10 had precipitated withdrawal after receiving buprenorphine in the emergency department. All of the patients who underwent precipitated withdrawal noted antecedent heroin or fentanyl use within the 2 - 24 hours prior to buprenorphine administration. The patients in this case series reported primarily using fentanyl or heroin daily, 90% reported fentanyl use, the most common mechanism of use was smoking; 60% reported heroin use. The mean age of participants was 34.3, 40% were Black or African American, 40% were white, 10% were Latino/a. The 10 patients in this case series had significant improvement in their symptoms as measured by COWS after administration of ketamine in the emergency department or inpatient setting. Patients in this cohort typically received ketamine 0.3 mg/kg IV infusion over 15 minutes, followed by 0.3-1 mg/kg infusion over 1 hour. The mean dose of Ketamine given was 63.2 mg (SD= 26.3) during the hospital encounter. This cohort of patients were able to discharge safely from the hospital and the majority (8/10) remained engaged in treatment through California Bridge services with linkage to substance use navigators.

Conclusion: Ketamine is a promising treatment for patients who have buprenorphine precipitated opioid withdrawal. This case series highlights the successful use of ketamine in an urban county emergency department. A prospective study of looking at effective treatment for precipitated opioid withdrawal is needed.

No, authors do not have interests to disclose

160 Emergency Medicine Attending Physician Performance of Pigtail and Thoracostomy Tube Insertion in a Simulated Environment

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Study Objectives: Emerging evidence suggests that attending physicians demonstrate variable performance of some bedside procedures. The primary objective of this study was to assess emergency medicine attending physician performance of pigtail and tube thoracostomy insertion in a simulated environment. Secondary objectives were to evaluate: 1) if a simulation-based mastery learning intervention improved performance, and 2) for potential correlations between baseline performance and participant comfort level or recent reported clinical experience.

Study Design/Methods: This was a pretest-posttest pilot study of 19 volunteer faculty members at a large academic emergency department. To determine baseline performance, one of four trained facilitators assessed participant pigtail and thoracostomy tube insertion using a task trainer and predefined checklist. For those not meeting a predetermined minimum passing score (MPS), the facilitator gave individualized feedback, directed practice, and repeated assessment until the MPS was achieved or the 1-hour session ended. Participants also completed a survey to collect information regarding recent clinical experience and comfort level, on a scale ranging from 1 (not at all comfortable) to 10 (completely comfortable) to perform each procedure. Correlations with baseline performance and participant comfort or recent clinical experience utilized Kendall's tau-b correlation coefficient. A related-samples Wilcoxon signed rank test was used to determine differences in performance and participant comfort before and after the educational intervention.

Results/Findings: Median participant checklist adherence was 89.7% (range 44.8% to 100%). Only 9/19 (47.4%) of participants met the MPS on initial assessment. A large proportion of participants reported not having primarily performed either procedure in the clinical environment within the last one (thoracostomy tube, 73.7%; pigtail 89.5%) and three (thoracostomy tube, 41.1%; pigtail, 57.9%) years. The number of procedures performed at one and three years did not significantly correlate with baseline checklist performance. Participant comfort to perform a pigtail catheter insertion, but not thoracostomy tube insertion, weakly correlated with checklist performance (Kendall tau-b 0.397, 95% CI 0.086 to 0.638, p = 0.029). Median participant assessment score (89.7% to 96.6%; p = 0.028) and procedure comfort level (thoracostomy tube, 7 to 9, p < 0.001; pigtail 5 to 9, p < 0.001) significantly improved following the educational intervention. After our educational intervention, 16/19 (84.2%) met the MPS.

Conclusion: In this pilot sample, emergency medicine attending physicians had suboptimal and variable simulated pigtail and thoracostomy tube insertion performance. A large proportion of participants reported not having personally performed either procedure in the clinical setting within the last three years.

Simulation-based mastery learning improved participant performance. These results have important patient safety implications and require validation in a larger sample.

No, authors do not have interests to disclose

161 Multicenter Interobserver Agreement of Lung Ultrasound Findings in COVID-19 Patients

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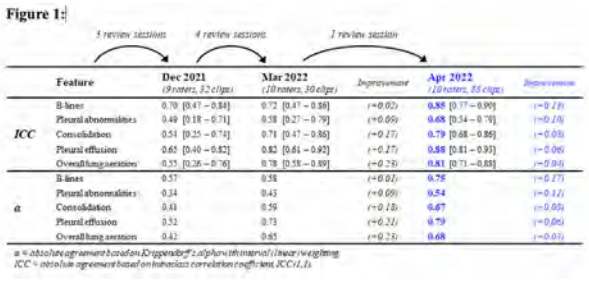
Study Objectives: Point-of-care ultrasound (POCUS) can detect sonographic features of COVID-19 on lung ultrasound including B-lines, thickened/irregular pleural lines, subpleural consolidations, and effusions. However, there is still a need to standardize classification and severity rating of these diverse findings. The purpose of this study was to develop a severity rating scale for lung ultrasound images collected on patients with COVID-19 disease based on multicenter expert consensus, and to test inter-rater reliability.

Methods: Development of the severity rating scale was done with a group of ten POCUS-trained emergency physicians from three academic institutions through review of the literature, expert opinion, pilot testing, and iterative refinement of the tool. The rating scale was refined after 8 one-hour consensus-building discussions based on challenging cases from three smaller-sample rater studies. The final scale consisted of a set of ordinal scores ranging from 0 to 4 for five sonographic findings: B-lines, pleural line abnormalities, consolidations, pleural effusions, and overall lung aeration. Lung POCUS clips from adult patients with COVID-19 were selected from a database of prospectively collected ultrasound exams curated at two academic hospitals. Ultrasounds were acquired from 14-zones (two anterior, two lateral, and three posterior zones on each side of the chest) using a handheld C5-2 curvilinear transducer on a lung preset. Using the refined scale, ten blinded reviewers independently rated selected clips using a Web-based annotation software. We analyzed the ratings to determine inter-rater agreement based on intraclass correlation coefficient (ICC) and linear-weighted Krippendorff's alpha statistic (α).

Results: We acquired 11,041 cine clips from 220 patients with lower respiratory tract symptoms suspected to have COVID-19. 62 patients were excluded due to negative COVID-tests, and an additional 40 patients were excluded because the exams were either incomplete or performed with an incorrect preset or different transducer. A research investigator independently completed pre-ratings for the remaining 4,115 clips using the refined scale. We then applied stratified random sampling to select one clip per patient, resulting in a dataset of 118 cine clips with high pathological burden sampled from this group of patients. After severity ratings were completed on the first 30 clips of the dataset, we held a final discussion session with a case-by- case review. For subsequent ratings done on the remaining 88 clips in the dataset, the average ICC was 0.80 across the five sonographic findings (0.85 for B-lines, 0.68 for pleural line abnormalities, 0.79 for consolidations, 0.88 for pleural effusions, and 0.81 for overall lung aeration). A similar trend in rater agreement was seen based on α (average 0.69 across the five sonographic findings). Strong improvements in rater agreement were observed with each successive review session and rater study (Figure 1).

Conclusion: We achieved good inter-rater agreement with our lung POCUS severity scoring system established by expert consensus. This severity scale will be used in future studies for training machine learning algorithms and could be utilized clinically for longitudinal assessment of COVID-19 severity.

Figure 1:



	Feature	Dec 2021 (9 raters, 32 clips)	Mar 2022 (10 raters, 30 clips)	Improvement	Apr 2022 (10 raters, 88 clips)	Improvement
ICC	B-lines	0.70 [0.47 – 0.84]	0.72 [0.47 – 0.86]	(+0.02)	**0.85** [0.77 – 0.90]	(+0.13)
	Pleural abnormalities	0.49 [0.18 – 0.71]	0.58 [0.27 – 0.79]	(+0.09)	**0.68** [0.54 – 0.78]	(+0.10)
	Consolidation	0.51 [0.25 – 0.74]	0.71 [0.47 – 0.86]	(+0.27)	**0.79** [0.68 – 0.86]	(+0.08)
	Pleural effusion	0.65 [0.40 – 0.82]	0.82 [0.61 – 0.92]	(+0.27)	**0.88** [0.81 – 0.93]	(+0.06)
	Overall lung aeration	0.55 [0.26 – 0.76]	0.78 [0.58 – 0.89]	(+0.23)	**0.81** [0.71 – 0.88]	(+0.04)
α	B-lines	0.57	0.58	(+0.01)	**0.75**	(+0.17)
	Pleural abnormalities	0.34	0.43	(+0.09)	**0.54**	(+0.11)
	Consolidation	0.43	0.59	(+0.16)	**0.67**	(+0.08)
	Pleural effusion	0.52	0.73	(+0.21)	**0.79**	(+0.06)
	Overall lung aeration	0.42	0.65	(+0.23)	**0.68**	(+0.03)

α = absolute agreement based on Krippendorff's alpha with interval (linear) weighting
ICC = absolute agreement based on Intraclass correlation coefficient, ICC(1,1)

Yes, authors have interests to disclose

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Disclosure: Alvin Chen is an employee of Philips Research North America

Employee

Alvin Chen is an employee of Philips Research North America

162 Feasibility and Diagnostic Yield of Mobile Cardiac Outpatient Telemetry (MCOT) Initiated from the Emergency Department

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Study Objectives: Complaints such as syncope, near-syncope, and palpitations remain common presenting ailments in the emergency department (ED), accounting for an estimated >1 million visits per year in the United States alone. In patients who are discharged from the ED, ambulatory electrocardiogram (ECG) monitoring can provide valuable diagnostic information and is recommended by many professional societies. Unfortunately, such monitoring is often underutilized due to concerns about patient compliance, diagnostic yield, and the cumbersome application process of older devices. However, significant advances in ambulatory ECG monitoring technology over the last decade prompt reevaluation of the role of this technology in the ED setting.

Methods: This retrospective review included all patients at an urban academic medical center in a 6-month period that underwent application of a mobile cardiac outpatient telemetry (MCOT) patch device prior to discharge from the ED. The decision to provide a patient with a patch was per provider discretion. These devices were prescribed for a 14-day period and were capable of continuous monitoring and transmission for the full duration. Patients were also able to trigger events when symptomatic which were correlated with the underlying cardiac rhythm. Data including arrhythmia information and compliance metrics were collected from the online device management suite. Significant arrhythmias were defined as ventricular tachycardia (VT) ≥4 beats, supraventricular tachycardia (SVT) ≥4 beats, ≥3 second pause, 2nd degree Mobitz II, 3rd degree AV block, atrial fibrillation, or ventricular fibrillation.

Results: In total, 117 patients underwent MCOT placement with mean age of 61.5 years. The most common indications included palpitations (29.9%), chest pain (20.5%), syncope and collapse (9.4%), bradycardia (6.8%), and tachycardia (6.8%). Data was received from 100% of patients with a median wear time of 13.8 days (range 1-14) and median compliance of 98.8%. Overall, 71.8% of patients were noted to have at least one significant arrhythmia with 27.4% having multiple arrhythmias. Symptomatic events occurred in 84.6% of patients, and an arrhythmia was noted during symptomatic events in 22.2% of patients. The most common arrhythmias observed were SVT ≥4 beats (65%), VT ≥4 beats (22.2%), atrial fibrillation (10.3%), sinus pause >3 seconds (6.0%), and high-grade atrioventricular block (2.6%). The average duration until first event was 4.1 days with a max duration until first event of 12.1 days. In 23.1% of patients, symptomatic events were reported despite no arrhythmia being recorded for the full duration of the wear period.

Conclusion: The development of MCOT patches have significantly increased the ease in which such devices can be administered from the ED. Patients who receive these devices show high compliance with them after discharge. These devices demonstrate stronger diagnostic yield for arrhythmias when compared to traditional event or Holter monitoring. Given the prolonged time from ED discharge to first event, there may be less utility in 24-hour observation admissions in patients with syncope which may improve overall hospital resource utilization.

Table 1: Summary of Arrhythmias

Arrhythmia	Count	Percent (n=117)
Ventricular tachycardia (≥8 beats)	10	8.5%
Ventricular tachycardia (≥4 beats)	26	22.2%
Pause (≥3 seconds)	7	6.0%
AV block (2nd degree Mobitz II or 3rd degree)	3	2.6%
Paroxysmal atrial fibrillation	7	6.0%
Permanent atrial fibrillation	5	4.3%
All atrial fibrillation	12	10.3%
Supraventricular tachycardia (≥30 seconds)	7	6.0%
Supraventricular tachycardia (≥8 beats)	60	51.3%
Supraventricular tachycardia (≥4 beats)	76	65.0%
Polymorphic VT, TdP, or VF	0	0.0%

Table 1: Count and percentage of significant arrhythmias recorded. (VT = ventricular tachycardia, TdP = Torsades de Pointes, VF = ventricular fibrillation)

Figure 1: Average Time to First Arrhythmia in Days

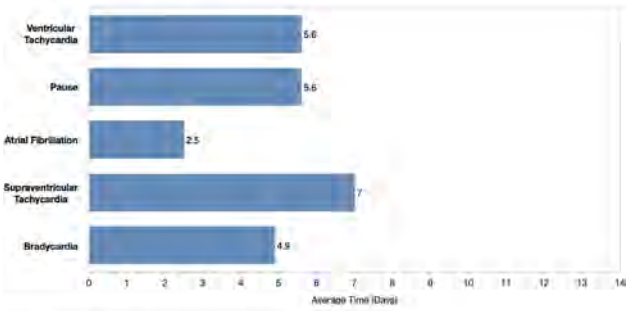

Figure 1: Average time to first arrhythmia in days.

No, authors do not have interests to disclose

163 Caustic Ingestions: Acids or Bases. Does It Matter?

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Background: Caustic ingestions can be classified as either acids or bases. Acidic ingestions can lead to coagulative tissue necrosis; basic ingestions can result in liquefactive tissue necrosis. While the coagulative necrosis is presumed to form an eschar that limits the depth of penetration, significant tissue damage can occur with both types of ingestion. While previous studies involving exploratory ingestions of bases demonstrated asymptomatic patients can be safely observed and discharged without an esophagogastroduodenoscopy (EGD), the safety of this practice in acidic ingestions has been questioned. The primary purpose of this study is to determine if patients with acidic ingestions have different clinical presentations or outcomes compared with basic ingestions.

Methods: This multicenter, multinational study evaluated patients between 1/1/14 through 12/31/20 who presented to the emergency department following a caustic ingestion. A significant esophageal injury was defined as having a Zargar grade IIb or III burn, or in-hospital death (if the patient died without an EGD). Non-significant esophageal injury was defined as having a grade 0, 1, or IIa burn. In addition, for patients who did not undergo an EGD, if follow up was available at least 30 days after the initial ingestion and no esophageal procedures were performed, patients were also considered to have a non-significant esophageal injury. Dangerous symptoms were defined a priori as the presence of dysphagia, dysphonia, vomiting, or oropharyngeal lesions. Isolated pain was not considered a dangerous symptom.

Results: 409 patients were identified; males accounted for 203 (49.6%) of subjects. The median (IQR) age was 18 (4-31) years (range 10 months to 78 years). There were 332 (81.2%) basic ingestions and ere 52 (12.7%) acidic ingestions. Two (0.49%) patients died during the index hospitalization. Six (11.5%) of the 52 acidic ingestions had significant esophageal burns, whereas 21 (6.3%) of the 332 of the basic ingestions had significant burns. Of the 42 cases of acidic ingestions without dysphagia or odynophagia, 2 (4.8%; 0.58- 16.1%) had significant esophageal burns, compared with 9 (3.2%; 95% CI 1.4-5.9%) of the 284 basic ingestions; p=0.64). On multivariate regression, adjusted for age, acid vs. base ingestion, and the presence of dysphagia or dysphonia, patients with acidic ingestions were not more likely to experience a significant burn (OR 1.7; p=0.11, 95% CI 0.9-3.1) compared to those with basic ingestions. All patients (including both acidic and basic ingestions) who had significant esophageal injury had at least one symptom other than pain.

Conclusion: In this series of acidic and basic ingestions, acids were not more likely than bases to have significant esophageal injury. The lack of symptoms other than pain, strongly suggests a non-significant esophageal injury. Thus, management should be dictated by clinical severity, rather than substance pH.

No, authors do not have interests to disclose

164 The Impact of Hallway Placement on Emergency Department Operations for Discharged Patients with Abdominal Pain

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Study Objectives: Emergency department (ED) crowding is a constant and relentless operational challenge facing hospitals across the country. In response to limited capacity many EDs increasingly care for patients in hallways to provide timely access to ED evaluation and facilitate ED flow. We sought to examine the impact of patient placement in the hallway on common ED throughput and quality measures for discharged abdominal pain patients.

Study Design/Methods: Observational retrospective study between July 2017 and February 2020 across two EDs in a health system that see over 100,000 annual visits. Data extracted included patient visit data such as age, race, insurance, emergency severity index, language, zip code as well as ED operational state including time of day/week, ED occupancy, boarding, and staffing. Primary outcomes were door to room time, room to provider time and provider to disposition time. Secondary outcome was ED bounce backs. Since hallway placement occurs at times of ED operational stress, multivariate regression was performed controlling for not only aforementioned patient demographics but also ED operational features when the index patient was placed in a bed. To capture the crowdedness of the ED, we include the number of regular and hallway beds occupied, the number of boarding patients in regular beds and hallway beds, and the number of patients in the waiting room. To approximate the actual workload in the ED, we include the staffing level, and the mean and variance of ESI scores for patients in regular and hallway beds, boarding patients, and waiting room patients. An instrumental variable was used to address the endogeneity issue when quantifying the impact of hallway placement.

Results: A total of 405073 ED visits were included with 37175 (9.2%) having abdominal pain, of which 23728 (63.8%) were discharged. Of discharged abdominal patients, 6385 (26.9%) were placed in a hallway bed, 69.4% were female and mean age was 40.1 (Std Dev 17.2). Hallway placement leads to 81% (63.8%, 93.8%) decrease in the door to bed time, but no significant impact on the bed to provider time and a 285% (50.6%, 888%) increase in provider to disposition time. With respect to secondary outcomes, hallway bed placement was associated with 14% (0.3%, 31.9%) and 29% (0.5%, 77.5%) higher 10 day and 30 day repeat ED visits, respectively.

Discussion: While the use of hallway beds is perceived as providing rapid access to emergency care in times of ED boarding and crowding, we find that improvement in early flow metrics may be at the risk of harming overall length of stay and quality of care. Hallway bed placement may complicate queues and provide care with less efficient processes and teams resulting in counterintuitively worse ED flow. Operational leaders should seek to implement front-end redesign processes that can minimize the use of ad-hoc hallway spaces to ensure desired throughput and quality benefits of timely ED care.

No, authors do not have interests to disclose

165 Trends in Emergency Department Dental Pain Visits During the COVID19 Pandemic

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Study Objectives: Early in the pandemic, visits to emergency departments (ED) fell, both in places affected and unaffected by the pandemic. However, not all patient populations were affected equally. Patients with dental pain present to the ED because of acute onset of pain, or because of lack of access to definitive dental care. With many dental offices and clinics closed due to the pandemic, patients with acute dental issues had limited

options for care. This study focused on the effect the pandemic on dental pain visits to EDs in the US. Secondarily, the mode of transport taken by these patients was described.

Background: Roughly 2% of annual ED visits in the US for dental complaints. EDs are the source of dental primary care at higher rates for children, uninsured and underinsured, minority populations, and those of low socioeconomic status. During the pandemic, ED visits decline by 42% between FW 1 and FW 13, 2020; ED visits make a recovery beginning in FW 20, 2020, returning to 88% of previous patient volume. Emergency declarations under the Stafford Act and the National Emergencies Act, coupled with the Health and Human Services Secretary declaration of a public health emergency resulted in the closure of most dental offices and clinics.

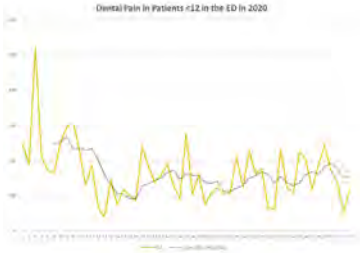
Methods: Data on ED visits for dental pain were extracted from ACEP's Clinical Emergency Data Registry (CEDR). CEDR is an emergency medicine specialty-wide registry to measure acute care quality, outcomes, practice patterns, and trends. It contains a repository of over 100 million visits. CEDR was queried for visits with a discharge diagnosis of dental pain. A subset of ICD-10-CM diagnosis codes specific to dental pain in the ED were identified by ACEP clinical subject matter experts. Unique visits were counted, not individuals, so two visits by one individual count as two visits. Count per fiscal week through 2020 were grouped into age categories (<12, 12-20, 21-65, >65, All Ages). National Emergency Medical Services Information System (NEMSIS) was queried for visits identified by same subset of codes. NEMSIS is the national database used to store Emergency Medical Services (EMS) data from states. Simple descriptive analysis was used.

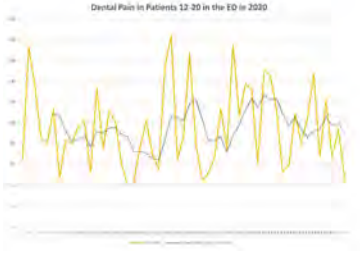
Results: EDs saw >50% decline in dental pain visits at the start of the pandemic (March 2020). Decline between January and March 2020 was most significant for patients <12 years of age. A similar pattern was observed in dental pain-related EMS calls. While dental visits did increase after the initial wave of the pandemic, visits by patients aged 12-21 saw the most recovery over the year. Pediatric patients – particularly those <12 – experienced the largest decline in visits with the least recovery since FW 12, 2020. Through December 2020, geriatric visits (>65) fell and showed poor recovery (4.04%), however, EMS calls for dental pain showed considerable increase (33.3%).

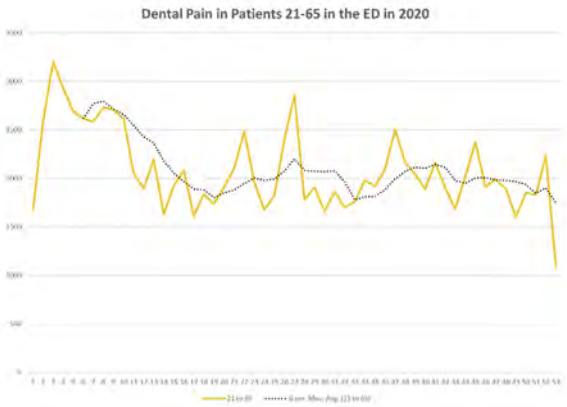
Conclusions: ED dental pain visits fell during FW 12, 2020. Visits by individuals 12-21 recovered faster and to a greater extent than other age groups, and notably visits by those >65 showed almost no recovery. Because of a likely positive correlation of dental disease with age and the closure of most dental providers, this suggests that geriatric patients did not receive dental care. The rebound of EMS transport over this period coupled with the increase in dental pain provider impressions suggests limited transportation options and atypical use of EMS for dental pain during the first pandemic year.

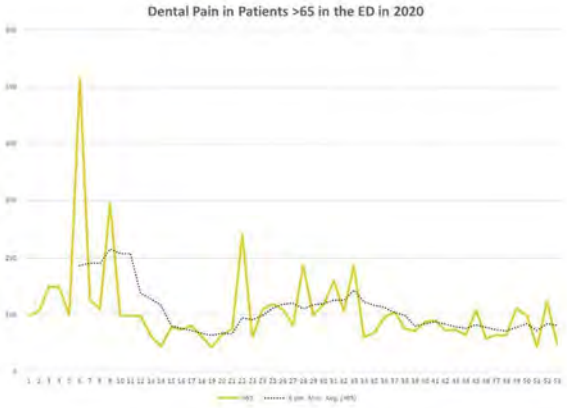
Dental Pain through the Pandemic – Figures

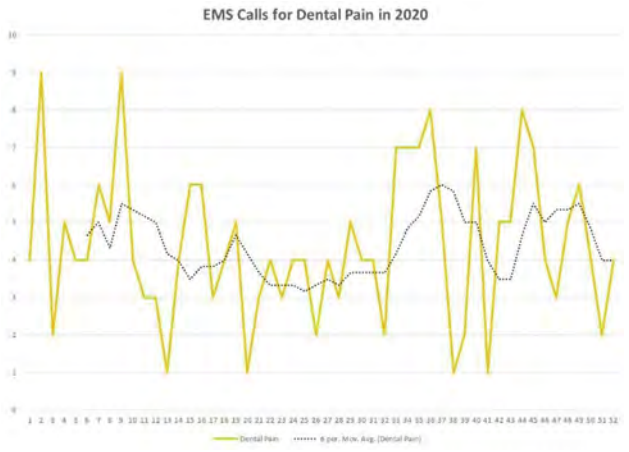
	Percent Change		
	Week 1 – Week 13	*Week 1 – Week 52*	*% Recovered*
<12	-92.54%	-76.67%	15.93%
12-21	-69.94%	-45.66%	24.28%
21-65	-48.98%	-30.27%	18.71%
>65	-55.55%	-51.51%	4.04%
Total Population	-55.33%	-37.55%	17.78%
EMS Transport	-88.8%	-55.55%	33.33%











No, authors do not have interests to disclose

166 Barriers and Facilitators to Emergency Medicine Residency Program Development in Latin America and the Caribbean

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Background: Although EM is rapidly expanding in Latin America and the Caribbean, there has been no formal evaluation of the implementation of recently established EM training programs to guide the process in other countries.

Study Objectives: We aimed to describe the barriers and facilitators of developing an EM residency training program in Latin American and Caribbean countries to identify and disseminate the relevant "lessons learned."

Methods:

Study Design: Semi-structured, virtual, individual qualitative interviews with key stakeholders involved in the development of EM residency programs in Latin America and the Caribbean. Interviews were in English or Spanish, recorded and transcribed. The Consolidated Framework for Implementation Research (CFIR) guided the interview and analysis using 5 constructs applied systematically to the varying program implementations: inner setting, outer setting, individuals involved, implementation process, and intervention characteristics.

Results: Fourteen interviews were completed with physicians from Nicaragua, Guatemala, Chile, Mexico, Argentina, Haiti, Peru, and Brazil. Inner setting: Major barriers included lack of EM-trained physicians in the teaching faculty, resistance from other specialties, and lack of general support which caused feelings of isolation for the initial EM residents. Facilitators included the formation of national EM associations, cultivation of local EM-trained faculty as residents graduated, adapting curriculum to local needs, and formal feedback processes for program improvement. Outer setting: Barriers included lack of autonomy of the medical schools from the government and limited public and health system awareness of the role of EM. The COVID-19 pandemic was a facilitator as it brought recognition and legitimacy to EM due to the relevant skill sets of Emergency physicians. Financial help and additional educational opportunities from foreign organizations were helpful in some cases. Individuals involved: Key individuals served as champions who advocated for the implementation of the EM specialty and served as the catalyst for the program implementation in their countries. Some non-Emergency physicians were considered a barrier because of discouraging or luring residents away from EM. Implementation process: Barriers included lack of resources (functional equipment, textbooks), lack of program accreditation, and difficulty engaging applicants due to limited exposure of specialty. Facilitators included recognition and program approval from the Ministry of Health and "grandfathering" to establish first local EM faculty. Intervention characteristics: Barriers included the language of the available EM literature and lack of relevant language skills of the volunteer foreign EM faculty. Lack of funding to provide sufficient salary or any salary at all for the initial EM residents was another hurdle. Facilitators included funding from the government or external entities, and a curriculum document outlining EM-specific objectives enabled consistent, targeted training.

Conclusions: Countries and organizations planning to initiate new EM training programs in Latin American and the Caribbean may benefit from the shared experience, including common barriers and facilitators to program establishment described by key stakeholders of recently developed programs in the region. Dissemination of these findings will avoid institutions "re-inventing the wheel".

No, authors do not have interests to disclose

167 Predictors of Sustained ROSC and Good Neurologic Outcome After PEA Arrest

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Introduction: Pulseless electrical activity (PEA) is one of many rhythms that can precede cardiac arrest. PEA arrests are associated with a poor prognosis, with a survival to discharge rate between 2% -5% for out-of-hospital cardiac arrest. Our county EMS system has a specific protocol for PEA arrest which includes use of mechanical CPR following first cycle, non-rebreather mask with BLS adjunct, hypothermia with cold (40C) saline infusion of 30mL/kg up to a maximum of 2L, followed by IV/IO epinephrine and, placement of orogastric tube and systematic consideration of the possible causes of PEA.

Methods: Our EMS system is one of the largest in our state, responding to more than 115,000 calls per year, and covering a geographic footprint of over 2010 square miles. All patients over the age of 18 for whom a call was made for unresponsiveness were included. This was a prospective observational study conducted as part of our county EMS system's quality and research program. Our IRB approved out-of-hospital research registry participates in the Cardiac Arrest Registry to Enhance Survival (CARES) database. ROSC was defined as resumption of sustained cardiac activity by means of a palpable pulse or equivalent for at least 30s. Sustained ROSC was defined as maintenance of pulse through the end of EMS resuscitation and arriving to the hospital alive. A good neurologic outcome was defined as a Cerebral Performance Categories (CPC) score of 1. A CPC of 1 corresponds to the patient being able to work and lead a normal life. May have mild dysphasia, non-incapacitating hemiparesis, or minor cranial nerve abnormalities. Statistical analysis was performed in JMP 16.0 for the mac.

Results: 235 patients in our cohort suffered OHCA due to PEA. 28% achieved ROSC, with 26% achieving sustained ROSC. This is ten times the national average. Seven percent made it out of the hospital alive. Three percent had a good neurologic outcome. The median time to CPR was 5 min (IQR 2-11). A logistic regression model was constructed to include age, sex, race, time to first CPR, whether an AED or mechanical CPR device was used, whether defibrillation was attempted, and whether arrest was witnessed, for each of the 2 outcomes. Factors associated with sustained ROSC included female sex (OR 2.5, 95% CI 1.3-4.6, P+0.0043), and receiving hypothermia care (OR 1.9, 95% CI 1.0-3.7, P=0.0454). For good neurologic outcome, time to first CPR was significant (OR 65, 95% CI 7-641, P=0.0001). The goodness of fit for this model was robust with a R2 of 36%. The area under the curve for the receiver operating characteristic was also robust at 89%.

Conclusion: A defined out-of-hospital protocol based on peri-arrest rhythm appears to confer a significantly better chance for sustained ROSC and good neurologic outcome.

No, authors do not have interests to disclose

168 Impact of Connecticut's Good Samaritan Laws in Preventing Opioid Overdose Deaths – An Applied System Dynamics Approach

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Study Objectives: We applied a participatory system dynamics (SD) modeling approach to evaluate the effectiveness and impact of Connecticut's Good Samaritan Law (GSL) that is designed to promote bystander intervention and reduce opioid overdose-related adverse outcomes.

Study Design/Methods: A total of six group model-building (GMB) sessions were held with key stakeholders to elicit feedback on a preliminary SD model that, in turn, contributed to the development of a more robust SD model. Session participants included bystanders, law enforcement personnel, first responders, pharmacists, physicians, and other health care professionals who worked in at least two major

metropolitan areas of Connecticut. The first three sessions aimed to identify key factors – facilitators and barriers – impacting the effectiveness of GSL, having participants construct "behavior over time" graphs, and creating causal loop diagrams to capture feedback relationships that could potentially explain these key factors. The next two sessions solicited feedback, interrogated qualitative SD model structures created by participants, and discussed policy scenarios identified in previous sessions. The final session presented a synthesis of key findings/narratives from previous sessions and top policy priorities of the stakeholders that emerged in the previous GMB sessions.

Results/Findings: The GSL improvement strategies were organized into seven categories: naloxone-related harm reduction, other (non-naloxone) harm reduction, relationship building, treatment, data utilization, education & media, and legal strategies. The stakeholders then voted on specific policies with the greatest potential impact, ultimately choosing four intervention targets: 1) naloxone access and use, 2) community-based harm reduction services and teams, 3) safer drug use, and 4) education to reduce stigma and change clinical culture. Simulations were performed to determine the estimated impact upon key clinical outcomes if these four areas of intervention were pursued, with the results suggesting that policy improvements that directly address gaps in current naloxone distribution in creative ways (eg, "leave behind" programs), systematically improve naloxone availability (eg, ensuring that all first responders carry naloxone), create safer spaces for drug use (eg, not using drugs alone), and link patients to treatment are most likely to show benefit.

Conclusion: SD modeling allowed us to capture complex interrelationships among multiple health outcomes to better assess the drivers of the opioid epidemic in Connecticut. Despite the grim statistics that the current opioid policies are not sufficient, our policy simulations do offer a path toward improvement by providing recommendations for data-driven changes. We believe that public health strategies that embrace a combination of locally acceptable, evidence-based interventions are most likely to be effective.

No, authors do not have interests to disclose

169 Establishing Reliable Detection and Follow–up of Newly Diagnosed Chronic Kidney Disease in Emergency Department Patients

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Study Objectives: Early detection and follow–up of chronic kidney disease (CKD) is important for management and to minimize disease progression. Since the first signal of new–onset CKD can occur during emergency department (ED) encounters, the purpose of this study was to determine the number of ED patients with abnormally low estimated glomerular filtration rates (eGFRs) who were at risk for progression to CKD and to develop workflows to help connect these patients to appropriate follow–up.

Methods: We executed a retrospective analysis of patients presenting to two EDs over a three–year period (March 2019 – March 2022). Patients with an eGFR < 60 mL/min/1.73 m2 with no similarly low value within the 12 months preceding the ED encounter in question were identified with an electronic query. A manual chart review was then performed to identify those patients who met the following criteria: (1) no prior objective diagnosis of CKD; (2) no documented follow–up in a reasonable timeframe for their abnormal eGFR; and (3) no normalization of eGFR during their encounter.

Results: From 306,818 ED encounters in the given time frame, 134 patients were identified by the electronic query, of which 43 patients (32%) met the additional three criteria specified above. These 43 patients were 65% male, with a mean (with standard deviation) and median age of 62 ($\pm$ 17) and 60 years, respectively. In this group of patients, the initial mean (SD) and median eGFR values were 47 ($\pm$ 11) and 50 mL/min/1.73 m2. Of note, 18 patients (42%) had no documented follow–up, nine patients (21%) had subsequent objective documentation of progression to CKD of any category, and three patients (7%) progressed to end–stage renal disease (ESRD) requiring hemodialysis. We also developed a proposed workflow for appropriate repeat lab testing and outpatient follow–up.

Conclusion: Of patients presenting to two EDs who were found to have an abnormally low eGFR, a significant fraction either progressed to CKD and/or ESRD, or lacked documented follow–up. Since the ED setting is well–positioned for early detection of CKD, this is an area in which ED providers may consider increasing their awareness and developing workflows for screening and arranging outpatient follow–up.

No, authors do not have interests to disclose

170 Evaluation of Performance of Transesophageal Echocardiography by Emergency Medicine Residents After a Single Simulation-Based Training Session

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Study Objectives: The primary objective of this study was to evaluate the proficiency and skills retention of performing transesophageal echocardiography (TEE) by emergency medicine (EM) residents after completion of a single simulation-based training session. Secondary objectives included assessing accuracy and time to diagnosis of simulated pathologies.

Study Design/Methods: This was a prospective, observational study which took place at a large community emergency department that has a 3-year emergency medicine residency. Eighteen EM residents without prior experience in TEE across all training levels were enrolled. This study was exempt by the institutional review board. Residents asynchronously viewed a 20-minute pre-recorded lecture on the basics of TEE followed by a 1-hour hands-on didactic session using a high-fidelity TEE simulator (CAE Vimedix, Montreal, Canada) led by ultrasound faculty. The residents' ability to perform a 3-view protocol was evaluated at 4 and 8 weeks after the initial training. Residents were also time-tested on their ability to recognize 3 separate simulated pathologies during the 4-week follow-up session.

Results/Findings: 18/18 (100%) residents completed the 4 week assessment; 16/18 (88%) completed the 8 week assessment. At 4 weeks, 100% (18/18) of residents demonstrated adequacy on all 3 TEE views; at 8 weeks 100% of residents who completed the session (16/16) demonstrated adequacy on all 3 views. On average, residents were able to adequately demonstrate and recognize cardiac tamponade, ventricular fibrillation, and severe systolic dysfunction in 9.4 s (median 9 s; range 3-23 s), 13.4 s (median 12 s; range 8-26 s), and 25.6 s (median 18 s; range 6-56 s), respectively.

Conclusion: After implementation of a 20-minute lecture and a 1-hour hands-on simulation-based training session, EM residents were able to adequately perform a 3-view TEE protocol at 4 and 8 weeks post-training sessions.

No, authors do not have interests to disclose

171 Presentations of Infants With Skull Fractures ≤ 3 Months of Age, With and Without Intracranial Hemorrhage

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Study Objectives: Head injury is common in children. Infants $\leq$ 3 months are problematic when assessing severity of head injury due to nonspecific signs, apparent minor injury resulting in significant intracranial trauma and inherent inaccuracy of Glasgow Coma Score (GCS). There are few studies evaluating the presentations of infants $\leq$ 3 months of age with and without ICH. We evaluated clinical presentation, exam, imaging, and management in infants $\leq$ 3 months of age with skull fractures, with and without associated ICH.

Methods: Emergency department retrospective chart review from 2008-2018 at a tertiary care children's hospital. Searched electronic medical record ICD9/ICD10 diagnoses of skull/facial fracture and CT scan reports skull fracture. Evaluated demographic data, presentation, exam, imaging, management, and disposition.

Results: 348 charts identified, 57 excluded as duplicates/inaccurate, 291 charts reviewed. Inclusion criteria $\leq$ 3 months, mean 6 weeks, 111 (38%) female, 62% male. No additional trauma evaluations in 12 month follow up. 232 (80%) reported fall. 240 (82%) scalp contusion/hematoma, 273 (94%) no other findings; 142 (88%) ICH with scalp hematoma only. 234 (80%) GCS 13-15, 5 (2%) GCS $\leq$ 8, 46 (16%) undocumented. 244 (84%) providers documented infant behaving normally (not fussy/irritable). Relative Risk (RR) physician abnormal behavior perception associated with ICH 1.32 (1.02, 1.71). 155 (53%) parents reported infants behaving normal. RR parent perception of abnormal behavior associated with ICH 1.21 (0.96, 1.52). 140 (87%) with ICH scalp hematoma vs 100 (81%) without. 161 (55%) had ICH, 130 (45%) without. 23 (8%) vomiting; 14 (9%) with ICH and 9 (7%) without. 7 (2%) history loss of consciousness (LOC); 4 (3%) with ICH vs 3 (2%) without. 217 (75%) fractures nondisplaced/nondepressed; 96 (44% cohort) without ICH, 120 (55%) with. 63 (22%) displaced/depressed; 39 (62% cohort) with ICH, 24 (38%) without. Of 161 with ICH, 86 (53%) subdural, 64 (40%) subarachnoid/intracerebral contusions, 11 (7%) epidurals. 12 (4%) skull fractures treated operatively. 6 (4%) ICH had midline

shift. 150 (93%) ICH admitted to Pediatric/Neonatal Intensive Care Unit (PICU/NICU), 11 (7%) floor, none discharged from emergency department (ED), no deaths. Of 124 without ICH, 28 (23%) admitted PICU/NICU, 23 (19%) floor, 73 (59%) discharged home from ED. 186 (64% total) Social Work (SW), child protective team (CPT), and/or Child Protective Service (CPS) assessment; 121 (65%) with ICH vs 65 (35%) without.

Conclusion: Infants $\leq$ 3 months with skull fractures are difficult to predict presence or absence of ICH regardless of presentation or exam, unless with severe brain injury with GCS $<$ 8. Regardless of ICH type, they often present with minor mechanisms of injury, low ICH predictability with reported LOC or emesis, have minimal abnormal findings on exam, with both parents and physicians appearing inaccurate at predicting the degree of intracranial injury based on behavior. Similar to other studies, management was conservative with 4% cohort requiring surgical management. Despite this, significant numbers required PICU/NICU observation and SW/CPT/CPS consultation. Findings suggest caution assessing infants with head injuries $\leq$ 3 months of age.

No, authors do not have interests to disclose

172 The Impact of Resuscitative Transesophageal Echocardiography Performed by Emergency Physicians on Diagnosis and Management of Critically Ill Patients

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Introduction: Transesophageal echocardiography (TEE) is an emerging tool that can aid emergency physicians in treating patients in cardiac arrest and undifferentiated shock. TEE can aid in diagnosis, resuscitation, identify cardiac rhythms, guide chest compression vectors, and shorten sonographic pulse checks. The objective of this study is to evaluate proportion of patients who underwent a change in their resuscitation management as a result of emergency department resuscitative TEE.

Methods: This was a retrospective cohort study of all patients who underwent ED resuscitative TEE from 2015-2019 at an academic hospital in Toronto, Canada. The primary outcome was the proportion of patients who underwent a change in their resuscitation management as a result of resuscitative TEE. Secondary outcomes were change in working diagnosis, complications, patient disposition, and survival to hospital discharge.

Results: 25 patients (median age 71, 40% female) underwent ED resuscitative TEE. All patients were intubated prior to probe insertion. The most common indication for resuscitative TEE was cardiac arrest (16/25) followed by undifferentiated shock (7/25) and post-cardiac arrest (2/25). Resuscitative TEE was performed by senior emergency medicine residents or ultrasound fellows under direct supervision in 10 cases. Probe insertion was successful in all 25 examinations (100%) with difficult insertions occurring in 9/25. Adequate TEE views were obtained for every patient. The most commonly obtained TEE views were the mid-esophageal four chamber (100%), mid-esophageal long axis (100%), mid-esophageal descending aorta (100%), transgastric short axis (96%), and mid-esophageal bicaval (68%). After resuscitative TEE, the management changed in 76% (N=19) and information was diagnostically influential in 76% (N=19) of patients. Therapeutic recommendations included guidance of hemodynamic support with volume (8/25) or vasoactive medications (6/25), decision to transfer the patient to the cardiac catheterization lab (3/25), and decision to terminate resuscitation (3/25). The most common diagnostic contributions included hypovolemic shock (5/25), cardiogenic shock (4/25), pulmonary embolism (4/25), cardiac standstill (3/25), and acute coronary syndrome (2/25). Ten patients died in the ED, 15 were admitted to hospital, and eight survived to hospital discharge. There were no immediate complications (0/15) and two delayed complications (2/15), both of which were minor gastrointestinal bleeding.

Conclusions: Resuscitative TEE is emerging as a valuable diagnostic and therapeutic tool for patients with cardiac arrest and undifferentiated shock in the ED. It is a relatively new emergency medicine modality with the first use described in the ED in 2008. It has been shown that it can be relatively easily taught to operators for resuscitations in the ED. There is limited published evidence on the use of ED TEE and this study contributes important data to the literature. In this study we found that the use of ED resuscitative TEE was associated with significant therapeutic changes in critically ill patients and resulted in a higher rate of adequate cardiac visualization than TTE alone. There was a low complication rate.

Table 1: Patients who underwent emergency department resuscitative transesophageal echocardiography

Patients N=25		Presentation	Resuscitative TEE findings	Post Resuscitative TEE Diagnosis	TEE provide diagnostic clarity (19/25)	TEE influenced management (19/25)	Complications / insertion difficulty / operator Trainee N =10, 2 complications, 3 difficult insertions Staff N = 15, no complications, 2 difficult insertions	Disposition
1	66F	Shock NYD	Global hypokinesis	Cardiogenic shock	Yes	Chrono/inotropes	None / easy / staff	ICU / survived
2	56M	Shock NYD	Hyperdynamic LV, PCE	Hypovolemic shock	Yes	Fluids	None/ easy / staff	ICU / survived
3	57F	Shock NYD	Hyperdynamic LV, flat SVC	Hypovolemic shock	Yes	Fluids	None / easy / staff	ICU / survived
4	47M	Cardiac arrest PEA/asystole	RV thrombus	Pulmonary embolism	Yes	No changes	None /difficult / staff	ED / died
5	90M	Cardiac arrest VF	VF	Cardiac arrest VF	No	No changes	None/ easy / trainee	ED / died
6	63F	Cardiac arrest PEA/asystole	Hyperdynamic LV	Hypovolemic shock	Yes	Fluids	None / difficult / trainee	ICU / died
7	66M	Cardiac arrest VF	Regional wall motion abnormality, PCE	Acute coronary syndrome	Yes	Cath lab	None / easy / staff	Cath lab / died
8	80F	Shock NYD	No abnormal findings	Shock NYD	No	No changes	None / difficult / staff	ICU / survived
9	66M	Cardiac arrest PEA/asystole	Cardiac standstill	Cardiac standstill	Yes	Terminate resuscitation	None / easy /staff	ED / died
10	55F	Shock NYD	Hyperdynamic LV	Hypovolemic shock	Yes	Fluids	None / easy / staff	ICU / died
11	74F	Cardiac arrest PEA/asystole	Cardiac standstill	Cardiac standstill	Yes	Terminate resuscitation	None / easy / staff	ED / died
12	86F	Cardiac arrest PEA/asystole	Right heart strain	Pulmonary embolism	Yes	Anticoagulation	UGIB[1] / easy / trainee	ICU / survived
13	87M	Cardiac arrest PEA/asystole	Inferior regional wall motion abnormality, right heart strain	Pulmonary embolism	Yes	Thrombolytics	None / easy / trainee	ED / died
14	48M	Shock NYD	Regional wall motion abnormality, flat SVC	Cardiogenic shock	Yes	Fluids Chrono/inotropes Cath lab	None / easy / trainee	Cath lab / survived
15	92M	Cardiac arrest PEA/asystole	Hypokinetic LV	Cardiac arrest NYD	No	CPR vector change Fluids Chrono/inotropes	None / easy / staff	ED / died
16	71F	Shock NYD	Hyperdynamic LV	Hypovolemic shock	Yes	Fluids	None / easy / trainee	ICU / survived
17	49M	Cardiac arrest PEA/asystole	Regional wall motion abnormality	Acute coronary syndrome	Yes	Cath lab	None / easy / staff	Cath lab / survived
18	88M	Cardiac arrest PEA/asystole	Cardiac standstill	Cardiac standstill	Yes	Terminate resuscitation	None / difficult /trainee	ED / died
19	60F	Cardiac arrest VF	Global hypokinesis	Cardiogenic shock	Yes	Chrono/inotropes	None / easy / staff	Cath lab / died
20	83F	Cardiac arrest PEA/asystole	Global hypokinesis, PCE, MS, AS, flat SVC	Cardiogenic shock	Yes	Fluids Chrono/inotropes	UGIB[2] / difficult / trainee	ICU / died
21	95M	Cardiac arrest VF	VF	Cardiac arrest VF	No	No changes	None / easy / staff	ED / died
22	62M	Post-cardiac arrest NYD	No abnormal findings	Post-cardiac arrest NYD	No	No changes	None / easy / trainee	ICU / died
23	63M	Cardiac arrest PEA/asystole	Hyperdynamic LV, RV dilated, RV thrombus	Pulmonary embolism	Yes	Thrombolytics	None / easy / staff	ED / died
24	90M	Cardiac arrest PEA/asystole	Global hypokinesis, dilated SVC	Cardiac arrest NYD	No	CPR vector change Chrono/inotropes	None / easy / trainee	ED / died
25	76M	Post-cardiac arrest NYD	Flat SVC	Post-cardiac arrest NYD	No	No changes	None / easy / staff	ICU / died

TEE: transesophageal echocardiography, F: female, M: male, NYD: not yet diagnosed, Chrono/inotropes: initiate or escalate chronotropes or inotropes, ICU: intensive care unit, LV: left ventricle, PCE: pericardial effusion, Fluids: intravenous crystalloid or packed red blood cells, SVC: superior vena cava, PEA: pulseless electrical activity, VF: ventricular fibrillation, pVT: pulseless ventricular tachycardia, RV: right ventricle, ED: emergency department, Cath lab: interventional cardiology catheterization lab, CPR: cardiopulmonary resuscitation chest compressions, MS: mitral stenosis, AS: aortic stenosis

[1]UGIB (upper gastrointestinal bleed): coffee ground fluid suctioned from the nasogastric tube on the same day as the TEE after receiving systemic anticoagulation for a pulmonary embolism, they were admitted to the ICU and started a proton pump inhibitor infusion, there was no drop in hemoglobin and did not require blood transfusion, survived to hospital discharge

[2]UGIB (upper gastrointestinal bleed): maroon coloured fluid suctioned from the nasogastric tube on the same day as the TEE, started on a PPI infusion. This patient had a history of lower gastrointestinal bleeding and was taking aspirin 81mg daily.

No, authors do not have interests to disclose

173 Leveraging Syndromic Surveillance Data to Create Emergency Department COVID19 Data Visualization Tool

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Study Objective: This program worked to identify and evaluate the utility of a rapidly deployed syndromic surveillance tool in improving awareness of public health crises within the emergency department.

Background: Emergency departments saw a dramatic drop in the number of patients presenting for care in the early part of the pandemic. That decrease in volume led to a decrease in revenue. Directors and administrative personnel needed to match staffing to anticipated patient volume in order to be financial stewards. Additionally, as emergency departments are the frontline responders to public health emergencies, increased information around PHE risk in these areas allows for better and more efficient response efforts.

Methods: During this time, the American College of Emergency Physicians (ACEP) established a relationship with the National Syndromic Surveillance Program (NSSP) to acquire aggregate data on country regions. This project was established and funded in part by a cooperative agreement with the Centers for Disease Control and Prevention (grant number 1 NU50CK000570). This data was displayed for our members in a 'data visualization' program on our Web site. This data was free and open to anyone accessing the ACEP Web site.

Results: COVID19 dashboard included visualizations of US emergency department (ED) data across three categories: total visits, COVID-like illness visits, and influenza-like illness visits. The data are available at both national and Health and Human Services (HHS) regional resolutions & across several timescales (eg, 7-day, 30-day, 90-day). Data are obtained from the U.S. Centers for Disease Control and Prevention through the National Syndromic Surveillance Program (01/01/2019-05/10/2022). Data and visualizations were updated weekly. Included below are images from the existing Web page showing the actual

visualization for the country. Each visualization can be drilled down to the DHHS region. The data was accessed 6,165 times with 5,229 unique visits since it was placed on the Web site on January 1, 2021. This data has been beneficial during the recovery period, when visits stabilized, and more recently during the resurgence of cases, particularly the Delta variant. As seen in the figures, data was most frequently accessed during times of COVID19 surges. In addition, it is hoped that emergency physicians who utilize this data will be more supportive of the efforts of NSSP going forward. In late 2021, the data visualization page was expanded to include anecdotal self-reporting of observed breakthrough cases in a novel approach to identifying rates and risk factors for breakthrough cases. Since its launch in January 2022, has been viewed more than 250 times with 225 unique page views. Similar to the original COVID-19 data visualization page, this syndrome-based breakthrough data has been utilized most frequently during recent surges and outbreaks.

Conclusion: Rapid utilization of surveillance data in data visualization efforts provides valuable tools for frontline providers to assess public health emergency risk and determine appropriate response actions and resource planning.

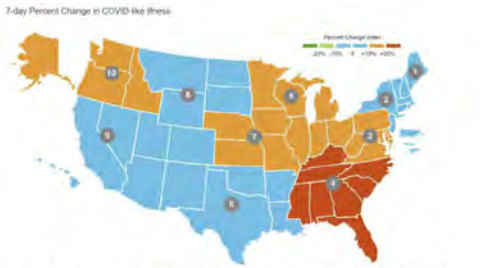

Image 1. National 7-day Percent Change in ED COVID-like Illness

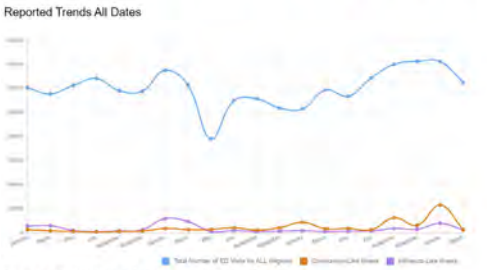

Image 2. National Reported Trends All Dates

Image 3. Trends in Emergency Department Visits for CLI + DD and ILI + DD

Image 4. ACEP COVID19 Data Visualization Page Views

Image 5. ACEP Breakthrough Case Data Visualization Page Views

No, authors do not have interests to disclose

EMF 174

Acute and Recurrent Firearm Injury Rates in an Urban Population (2010-2021): Using Machine Learning to Improve Classification

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Study Objectives: Firearm injury is the leading cause of death in children and young adults in the United States. In 2018, Washington University in St. Louis (WUSTL) developed the St. Louis Hospital-based Violence Intervention Program Data Repository (STL-HVIP-DR) from hospital administrative data. This repository shares data on traumatically injured patients (blunt assault, stabbing, firearm injury) across the two research universities (WUSTL and St. Louis University) and their four associated adult and pediatric level-I trauma hospitals. These hospitals care for the majority of firearm injured patients in St. Louis, thereby creating a region-wide longitudinal registry of ED and hospital-treated firearm injuries. The primary objective is to apply a machine learning classification model to estimate the rate of acute and recurrent firearm injuries in an urban population.

Methods: This was a retrospective cohort study of firearm-injured patients form 01/01/2010—12/31/2020 captured in the STL-HVIP-DR. Variables included patient demographics (name, date of birth, sex, race, ethnicity, zip code of residence), hospital of presentation, ED and hospital arrival and discharge timestamps, ICD 9 and 10 codes, insurance payer/carrier, and disposition (discharge, admit, death). We included all patients with at least one ICD code for firearm injury. From those, we randomly selected 500 patients with 808 unique visits for physician manual review of all their medical encounters for firearm injury. These data were used to build and internally validate a machine learning classification model to predict whether a firearm injury was a "true" acute injury or a "false" follow-up visit associated with a prior injury (eg, pain or wound check). These visits were randomly split into training (70%) and test (30%) datasets. Our model was generated using least absolute shrinkage and selection operator (LASSO) regression. Model covariates were chosen to classify on clinical presentation (eg, diagnostic codes, injury severity, admission type). We evaluated model performance with area under the curve (AUC) and its 95% confidence interval (CI). This model was then applied to all firearm injury visits in the STL-HVIP-DR linked with the National Death Index (NDI) to estimate acute and recurrent firearm injury rates.

Results: There were 135,301 medical visits for 99,456 unique patients in the STL-HVIP-DR and 22,584 visits had at least one firearm injury diagnosis for 13,442 unique patients (Table 1). The classification model had high accuracy with AUC = 0.91 (95% CI 0.86-0.95). When applied to all 22,584 firearm injury visits 13,606 (60.2%) visits were classified as a "true" acute firearm injury. Of the 13,442 unique patients, 1,413 (10.5%) were estimated as presenting with a recurrent firearm injury.

Conclusion: The classification model presented herein is a viable methodology to identify "true" acute firearm injuries. Our injury rate calculations are strengthened by our robust sample size, data from multi-system adult and pediatric trauma hospitals, and data linkage with the NDI. There is a need to accurately identify acute firearm injuries to better define the burden of this disease, and to facilitate robust impact evaluation of violence intervention programs. This model improves on our team's prior efforts to accurately identify acute and recurrent firearm injuries from firearm-associated ICD codes alone.

Table 1. Demographics of patients with a firearm injury 2010-2020

	Total (N = 13,442)		Repeat firearm injury (N = 1,413)	
Age – median (IQR)*	27	(20-37)	24	(19-30)
Sex – n (%)				
Male	11,444	(85.1)	1,302	(92.1)
Female	1,990	(14.8)	110	(7.8)
Unknown	8	(0.1)	1	(0.1)
Race – n (%)				
Black or African American	11,037	(82.1)	1,331	(94.2)
White	1,918	(14.3)	63	(4.5)
Unknown or Patient Refused	323	(2.4)	14	(1.0)
Other	102	(0.8)	3	(0.2)
Asian	30	(0.2)	2	(0.1)
Multi-Racial	18	(0.1)	0	--
American Indian/Alaskan Native	12	(0.1)	0	--
Native Hawaiian/Pacific Islander	2	(0.0)	0	--
Ethnicity – n (%)				
Neither Hispanic or Latino	13,253	(98.6)	1,402	(99.2)
Hispanic or Latino	137	(1.0)	9	(0.6)
No Ethnicity Reported	52	(0.4)	2	(0.1)

** Age was missing for 3,813 total patients and for 504 patients with repeat GSW injuries. The age range was 0-86 and 0-83 for total and repeat GSW patients (respectively).*

No, authors do not have interests to disclose

175 National Trends in Chemical Restraint for Pediatric Behavioral Health Patients in the Emergency Department

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Study Objective: In the emergency department (ED), chemical restraints are utilized for patients who present imminent danger to self or others. In children and adults, increased restraint has been associated with black males for both chemical and physical restraints. Further although most pediatric ED visits occur in community hospitals, pediatric studies have analyzed only those seen at freestanding children's hospitals. With the rising pediatric behavioral health crisis, we sought to evaluate trends and hospital variation in the use of chemical restraint for pediatric behavioral health patients and assess for any association with race/ethnicity or hospital-level factors.

Study Methods: This was a retrospective cohort study of pediatric ED patients ages 8-17 treated at hospitals contributing to the Premier Database between January 1, 2018-December 31, 2020 who had an ED discharge diagnosis associated with a mental health or behavioral condition, identified via the presence of an International Classification of Diseases, Tenth Revision code using the Child and Adolescent Mental Health Disorders Classification System (CAMHD-CS). Hospitals contributing fewer than 50 cases during the study period were excluded. The primary outcome was the proportion of patients with a behavioral health ED diagnosis who underwent chemical restraint. This was defined as receipt of an intramuscular benzodiazepine or antipsychotic medication. We also developed a hierarchical model, adjusting for patient and hospital variables, to compute a median odds ratio (MOR) to quantify the contribution of the individual hospital on the odds of a patient being discharged from the ED. Additionally, we performed a descriptive analysis of medications used and the proportion chemically restrained before or during the COVID-19 pandemic.

Results: A total of 630,399 patients from 822 hospitals were included in the overall cohort and 29,399 (4.7%) were administered medication associated with chemical restraint. The median age was 15 (IQR 13-16), 54.6% were female, and 59.3% were white. Compared to those who did not receive chemical restraint, those who were chemical restrained were more likely to be older (13-17 years [OR 1.61, 95% CI 1.56-1.67]), privately insured (OR 1.21, 95% CI 1.18-1.25), or have a concurrent ED diagnosis of anxiety disorders (OR 1.72, 95% CI 1.67-1.77), and disruptive mental health diagnosis (OR 1.69, 95% CI 1.61-1.77). There was no difference in chemical restraint for race/ethnicity (Black OR 0.97 [95% CI 0.94-1.01], Hispanic OR 0.99 [95% CI 0.95-1.03], or sex (female OR 0.94 [95% CI 0.92-0.97]). Overall, 4.7% received medications associated with chemical restraint. After adjusting for patient and hospital factors, the influence of the individual hospital on the odds of chemical restraint was 1.44 (MOR; 95% CI 1.40-1.47). Overall, chemical restraint rates were similar across hospital covariates except for geographical region, where the median restraint rate was much lower in the Northeast (3.8%; IQR 2.9-5.1). During the COVID-19 pandemic, median rates of chemical restraint were higher (6.0%, 95% CI 5.8-6.1) compared to pre-pandemic (4.4%, 95% CI 4.3-4.4).

Conclusion: We found that age, but not race/ethnicity or sex, was associated with a higher odds of chemical restraint during ED visits associated with a mental health or behavioral diagnosis. Although hospital-level restraint rates were low, we found that practice varied across hospitals and regions.

Table. Patient and Hospital Variables Associated with Chemical Restraint

Patient Variable	**Characteristic**	**Odds Ratio (95% CI)**
Age	8-12	Reference
	13-17	1.61 (1.56-1.67)
Gender	Male	Reference
	Female	0.94 (0.92-0.97)
Race	White	Reference
	Black	0.97 (0.94-1.01)
	Hispanic	0.99 (0.95-1.03)
	Other	1 (0.96-1.04)
Insurance	Public (Medicaid)	Reference
	Private	1.21 (1.18-1.25)
	Uninsured/Other/Unknown	0.99 (0.95-1.03)
Concurrent Emergency Department Visit Diagnoses	Hyperactivity Disorders	0.68 (0.66-0.71)
	Anxiety Disorders	1.72 (1.67-1.77)
	Bipolar Disorders	1.27 (1.21-1.33)
	Disruptive Disorders	1.69 (1.61-1.77)
	Neurocognitive Disorders	1.14 (1.03-1.25)
	Substance Disorders	1.25 (1.21-1.30)
	Trauma Disorders	0.83 (0.78-0.87)
	Depressive Disorders	0.49 (0.47-0.51)
	Suicide/Self Injury	1.34 (1.30-1.38)
Comorbid Medical Complexity	Non-Chronic	Reference
	Non-complex Chronic	0.96 (0.92-1.00)
	Complex Chronic	1.32 (1.26-1.39)
Hospital Variable	**Characteristic**	**Interval Odds Ratio (80% CI)**
United States Region	West	Reference
	Midwest	0.91 (0.82-1.00)
	Northeast	0.70 (0.61-0.78)
	South	0.90 (0.81-0.98)
Size	Small (<200 beds)	1.21 (1.09-1.32)
	Medium (200-400 beds)	1.13 (1.02-1.23)
	Large (>400 beds)	Reference

Teaching status	Non-teaching	0.94 (0.86-1.01)
	Teaching	Reference
Community Served	Rural	0.91 (0.84-0.98)
	Urban	Reference
Pediatric Expertise	Minimal Pediatric Specialty Support	1.07 (0.80-1.34)
	Moderate Pediatric Specialty Support	1.07 (0.80-1.33)
	Extensive Pediatric Specialty Support	1.03 (0.77-1.29)
	Freestanding Children's Hospital	Reference

No, authors do not have interests to disclose

176 Point-of-Care Electroencephalography Enables Rapid Evaluation and Management of Non-convulsive Seizures in the Emergency Department

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Study Objectives: Non-convulsive seizures (NCSs) are increasingly recognized as a cause of altered mental status in the emergency department (ED). NCSs are primarily diagnosed using electroencephalography (EEG), however this tool is often unavailable in most academic and community hospital EDs. The resultant uncertainty in diagnosing NCSs clinically is significant and leads to delayed and often inappropriate treatment with anti-seizure medications (ASMs), unnecessary intubation, and increased morbidity. Point-of-care electroencephalography (pocEEG) could fill this critical gap in the ED, as it has for inpatient and intensive care unit (ICU) settings. In this study, we aimed to describe our institutional experience with pocEEG and its impact on the evaluation and management of ED patients with suspected NCS.

Study Design/Methods: We retrospectively found 319 patients who underwent at least one episode of pocEEG monitoring at Providence Mission Hospital between January 1, 2020 and December 31, 2020. One hundred fifty-seven patients had their first pocEEG in the ED. Providence Mission Hospital is a large, suburban, community medical center with an annual ED volume of 64,000 visits. We reviewed each patient's medical record and extracted pocEEG findings from the ED monitoring episode. The findings were categorized into three groups: 1. seizure, 2. highly epileptiform patterns (HEP), and 3. slow/normal activity. We excluded repeated monitoring/studies for the same patient. We tabulated ASM treatment information including timing (out-of-hospital, pre-pocEEG, or post-pocEEG), medication, and dose to determine whether pocEEG led to either appropriate ASM escalation or avoidance of inappropriate ASM escalation. Comparisons of categorical data were performed using chi-square tests with Bonferroni correction for multiple comparisons.

Results/Findings: Of the 157 ED patients (mean age 57.7±22.4 years, 49% female), pocEEG revealed seizures in 22 (14%), HEP in 33 (21%), and slow/normal activity in 102 (65%). The majority of studies (53%) were performed after-hours (5p-8a) when traditional EEG is unavailable, and most patients were admitted (54% to ICU, 41% to floor). Five patients (3%) were treated with ASMs prior to ED arrival by paramedics, 93 patients (59%) were treated in the ED prior to pocEEG monitoring and 80 patients (51%) were treated after pocEEG monitoring. Twenty-one patients who received ASMs before, during, and after the start of pocEEG are counted twice. By reviewing each patient's ED course and the relationship between pocEEG monitoring and ASM treatment, we found a statistically significant association between pocEEG findings and changes in management ($p<0.001$). Patients with seizures were significantly more likely to be treated than patients with slow/normal activity (59% vs 25%, $p=0.002$) and patients with slow/normal activity were significantly more likely to not have treatment escalation (28% vs 0% for seizure plus HEP patterns, $p<0.001$).

Conclusion: Our study, the largest to-date describing the use of point-of-care EEG in emergency medicine, found that rapid acquisition of EEG in the ED appropriately impacted management of suspected NCS. By guiding bedside diagnosis, point-of-care EEG can empower ED physicians to develop a novel approach to the evaluation and management of patients with suspected NCS and can positively and substantially impact the care of patients with neurological emergencies.

Yes, authors have interests to disclose
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177 Impact of a Large Gathering on COVID-19 Transmission in a Community With Multiple Broad Mitigation Measures - New Orleans, Louisiana, October 18, 2021 - November 11, 2021

St. Romain M, Avegno J, Tiao J, Vaughn J, McInturff M, Melendez-Salgado A, Bloemer N, Grant A, Lim S, Burgess R/Louisiana State University Health Sciences Center, New Orleans, Louisiana, US

Study Objectives: Currently, there are limited data informing the risk of a COVID-19 outbreak associated with a large public outdoor event in a city with a low incidence of new cases and high vaccination rates. Prior to the beginning of the 2022 carnival season, New Orleans Health Department surveyed parade participants and the immediate crowd regarding COVID-19 during a large outdoor parade called "Krewe of Boo." This study is one of the first to analyze the risk of a COVID-19 outbreak associated with a large outdoor gathering with limited potential for additional mitigation measures.

Study Design/Methods: A unique health surveillance program was developed through collaboration with state and local health departments to assess participants' general demographics, place of residence, vaccine status, and self-reports of illness in the preceding three days to the event. Follow-up was obtained through questionnaires on days seven and fourteen post-event. The surveys were designed to be easily accessible and usable on smartphones via QR codes, though paper versions were available in several languages. Based on self-reported survey results, an analysis of vaccination status, mask-wearing behaviors, and perceived health. Data were obtained by New Orleans Health Department (NOHD) and Louisiana Department of Health (LDH) staff and trained volunteers. Methods for data collection of the crowd cohort included non-rapid PCR testing and surveys on-site, home tests provided to survey respondents, and direct observation of mask-wearing. Parade participants received emails and/or texts with surveys prior to the event and had access to voluntary PCR testing at a pre-parade event.

Results: Parading members were required by their organization to provide proof of vaccination or negative PCR test within 72 hours; there was no such requirement for the crowd participant. Of the 1080 crowd members surveyed, 93% self-reported being vaccinated; 98% of the 195 surveyed parade members self- reported being vaccinated. This prospective cohort study found that 0 participants in the crowd and parade member group reported positive COVID testing in the 1-week follow-up survey, and 0 participants reported positive COVID test in the 2-week-follow-up survey, although response rates at this time were 36.9% and 48%, respectively. Approximately 60% of crowd respondents reported wearing a mask at least sometime during the event; however, field observations noted mask-wearing was scarce. Louisiana Department of Health crossed-referenced all crowd and parade member data with the state testing database identifying two positive cases- 1 on day 15 post-event and one on day 19. Additionally, there was no significant change in the weekly average case number in New Orleans, Louisiana, two weeks after the event.

Conclusion: In conclusion, with relatively high community vaccination rates, broad mitigation measures such as indoor masking and vaccine/negative test mandates, and low underlying incidence of COVID-19 cases, a large outdoor event was not associated with a significant increase in transmission during Delta variant predominance. This study served useful when determining the potential public health implications of permitting a region-wide carnival season known as Mardi Gras.

Table 1. Self-reported vaccination status and perception of well-being before and after event.

	Fully vaccinated	Felt ill within 3 days pre-parade	Felt ill 1-7 days post parade	Felt ill 8-14 days post parade
Crowd	93%	2.2%	2.6%	2.3%
Parade members	98%	0	3.8%	3.4%

No, authors do not have interests to disclose

178 Assessing the Sympathetic Response of Physicians and Trainees When Exposed to a Virtual Reality Mass Casualty Incident Simulation

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Background: The occurrence of mass casualty incidents (MCIs) is on the rise. An appropriate medical response is predicated on preparation and training. Virtual reality (VR) platforms have previously been shown to be well-received, engaging, and immersive for these situations, but the human physiological responses towards VR MCI training are largely unknown. Controlled recruitment of the sympathetic nervous system has been associated with improved retention of memories and skills and is thus an attractive target for achieving optimal medical readiness for high-impact and stressful events like MCIs.

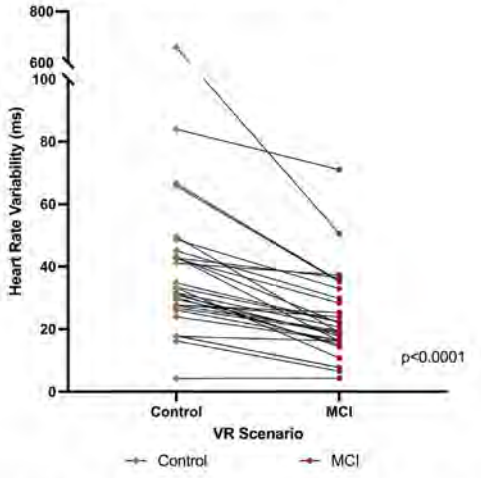
Study Objective: The primary objective of this study was to ascertain if a human actor-based VR mass casualty scenario could elicit a sympathetic response, measured via heart rate variability (HRV), in medical doctors and trainees. HRV serves as a mathematical representation of the frequency of vagally driven respiratory sinus arrythmia, where a decrease in the HRV value relative to baseline represents sympathetic activation.

Methods: An MCI simulation was drafted and filmed at a first-person vantage point utilizing a GoPro MAX 360 camera. After IRB consent was obtained, subjects observed the MCI simulation wearing an Meta Quest VR headset while their electrocardiographic (EKG) activity was recorded via the PowerLab15T Data Acquisition Unit (ADInstruments). EKG data was analyzed in PowerChart (ADInstruments) to derive HRV metrics. Wilcoxon matched pairs signed rank analysis and Welch's t-test, both powered at 0.8, were performed in Prism9 (GraphPad) analytical software. Multivariate logistic regression was also performed (Prism9, Graphpad) to elicit factors associated with increased sympathetic activation. Statistical significance was established at $p<0.05$.

Results: Thirty-five total subjects were enrolled: 6 attending physicians (3 trauma surgeons, 3 emergency physicians), 14 residents (8 EM residents, 6 surgery residents) and 15 medical students. A significant decrease in HRV was observed by Wilcoxon's matched pairs test across all groups in the MCI (median 20 ms IQR 16.2, 31.4 ms) compared to baseline (33.2 ms IQR 27.2, 44.1 ms; $p<0.0001$; Figure 1). Sympathetic activation was most pronounced in medical students but was approximately equal between attending and resident physicians. There was no significant difference by Welch's t-test in the sympathetic activation of Emergency physicians (-46.7% +/- 30.6%) versus surgeons (-45.5% +/- 25.2%; $p=0.57$). In all groups, sympathetic activation occurred independent of heart rate, age, sex, number of years in practice, first responder experience, or prior MCI response.

Conclusion: Live-actor VR MCI simulation elicited a strong sympathetic response across all groups. VR MCI training has the potential to enhance disaster training in a low-cost and reproducible manner. Further studies are needed to compare live-actor VR simulation to other forms of training for determining optimal methods of memory retention in MCI task execution.

Figure 1: Heart Rate Variability In Control and MCI Scenarios



A before-after plot showing the change in each subject's heart rate variability (HRV) from the baseline condition (orange diamond) to the mass casualty condition (red circle). A significant decrease in HRV was appreciated by Wilcoxon matched pairs signed rank analysis, signifying sympathetic activation in the MCI condition. *VR= Virtual Reality, MCI=mass casualty incident, ms=millisecond.*

No, authors do not have interests to disclose

179 Association Between Bystander Cardiopulmonary Resuscitation With and Without Public Access Defibrillator Use and Neurologic Outcomes After Out-of-Hospital Cardiac Arrest

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Study Objective: The aim of this study was to investigate the association between bystander cardiopulmonary resuscitation with and without AED (automated external defibrillator) use and neurological outcomes after out-of-hospital cardiac arrest (OHCA) in Korea.

Methods: We used Korean national out-of-hospital cardiac arrest (OHCA) registry. We included adult OHCA patients with presumed cardiac etiology between 2015 and 2019. We excluded cases witnessed by an emergency medical service (EMS) provider. Exposure was bystander cardiopulmonary resuscitation (CPR) categorized into 3 groups: no bystander CPR, bystander CPR without AED use, and bystander CPR with AED use. The primary outcome was good neurological recovery at discharge. Multivariable logistic regression analysis was performed. Using interaction analysis, we also analyzed whether the effect differed according to the place of arrest, witness status, and EMS response time.

Result: A total of 93,623 patients were analyzed. Among them 35,486 (37.9%) of patients belong to no bystander CPR group, 56,187 (60.0%) patients belong to bystander CPR without AED group and 1,950 (0.02%) patients belong to bystander CPR with AED group. Good neurological recovery was demonstrated in 1,286 (3.6%), 3,877 (6.9%) and 208 (10.7%) among no bystander CPR group, bystander CPR without AED group, and bystander CPR with AED group, respectively. Compared to no bystander CPR group, adjusted odds ratio (95% confidence intervals) for good neurological recovery were 1.54 (1.45-1.65) in bystander CPR without AED group, and 1.37 (1.15-1.63) in bystander CPR with AED group, respectively. In interaction analysis, the effect of bystander CPR with AED group was more apparent in circumstances with witnessed arrest and with prolonged EMS response time ($\geqq 8$ minutes).

Conclusion: Bystander CPR regardless of AED use was associated with improved neurological recovery after OHCA. However, the benefit of AED use was not prominent. Efforts to disseminate AED and ensure proper utilization during bystander CPR are warranted.

No, authors do not have interests to disclose

180 A Cellular Host Response Test May Enable Compliance With the Medicare Sepsis Quality Measure While Promoting Antimicrobial Stewardship Aims

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Study Objectives: Due to the need for rapid recognition and treatment of sepsis to positively impact outcomes in patients with the condition, guidelines to assist clinicians in management of the condition place emphasis on early recognition and intervention. The Sepsis CMS core measure (SEP-1) requires measuring of serum lactate, obtaining blood cultures prior to antibiotics, and administering antibiotics within 3-hours of presentation for those presenting with severe sepsis. In order to meet this measure, ED physicians often must intervene before adequate, objective diagnostic and prognostic data are available, resulting in a 'one size fits all' strategy for all those presenting that are suspected of sepsis. This study aimed to assess the Intellisep Index (ISI) as a potential aid for risk stratification and appropriate resource allocation for the treatment of patients presenting to the emergency department with possible sepsis.

Study Design/Methods: The IntelliSep test is an investigational in vitro diagnostic that quantifies the state of immune activation by measuring the biophysical properties of leukocytes from a routine blood sample in under 10 minutes. The test provides a single score, the IntelliSep Index (ISI), between 0.1-10.0, stratified into three discrete interpretation bands of increasing risk for disease severity: Green (low), Yellow (moderate), and Red (high). Adult patients presenting to the ED with signs or suspicion of infection (2+ SIRS or order for cultures) were prospectively enrolled at multiple US sites (Apr. 2019 - Feb. 2020). EDTA-anticoagulated blood was assayed within 3 hours of draw, and patients were followed by retrospective chart review for outcome information. Infection status was determined through blinded retrospective physician adjudication. The sepsis-2 consensus standard criteria for organ dysfunction, hypoperfusion, or hypotension were utilized.

Results: The 301 study patients (sepsis prevalence 12.6%) were stratified by the ISI as 165 (55%) Green, 76 (25%) Yellow, and 60 (20%) Red. The test achieved a Positive Percent Agreement (sensitivity) of 97.4 (86.2 - 99.9, 95% CI) and Negative Percent Agreement (specificity) of 86.3 (68.7 - 94.0, 95% CI). 10 of the 24 septic patients in the Red band and 9 of the 13 in the Yellow band, did not receive the SEP-1 measure care within 3-hours of triage. In contrast, 7 non-septic patients in the Green band received the SEP-1 measure care within 3-hours of triage. Additionally, 15 non-septic patients in the Green band were administered Antipseudomonal or Anti-MRSA antimicrobial agents. It is important to note that the one septic patient in the green band received the SEP-1 measure care within 3-hours of triage.

Conclusion: The ISI, a rapid, quantitative measure of immune activation, may have the potential to offer ED clinicians an aid for rapid risk stratification of patients presenting with suspicion of infection and guide appropriate compliance with the Medicare sepsis quality measure while promoting antimicrobial stewardship aims.

Yes, authors have interests to disclose

Disclosure: Cytovale

Employee

Cytovale

181 Hospital System Acute Care at Home to Prevent Emergency Department Visits

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Study Objectives: Previously, the use of acute hospital-level care at home (hospital-at-home) for patients who are chronically ill has led to decreased medical costs, amount of sedentary time for patients, and hospital readmissions. Our large integrated health care system identified the need to develop a mechanism through which to prevent frequent emergency department (ED) visits in chronically ill patients and hospital admissions for patients requiring limited hospital resources. We addressed this by creating a home acute care program called Urgent Dispatch. The objective of this study was to provide a descriptive analysis of the patient population utilizing the program and identify potential emergency department visits within seven and 30 days of program enrollment.

Methods: This is a retrospective review of all patients referred to the Urgent Dispatch program from April 1, 2021 through February 28, 2022. We assessed encounters for patient demographics, referral source, reason for visit, number of at home visits, total number of days in the program, and determined if the patient had an ED encounter within seven and 30 days of participation in the program. We categorized the referrals as ED, outpatient: specialist, outpatient: primary care, inpatient, virtual, or other. The health care system includes 10 hospitals (rural, community and academic) and their associated outpatient clinics. Categorical variables are presented as frequencies and percentages. Continuous variables presented as mean and standard deviation or median and quartiles depending on distribution.

Results: A total of 2,077 orders were evaluated with 1,536 (74%) resulting in enrollment in the Urgent Dispatch program. The majority were elderly (mean age 76 years), white (67%), female (65%), and had Medicare (71%). The median number of visits made by Urgent Dispatch was 1 [1-2]. Median days enrolled in the program was 1 [1-2]. The top three referral sources to the program were outpatient primary care (58%), emergency department (22%), and outpatient specialist (6%). The top five referral complaints were heart failure (5%), edema (5%), dyspnea (5%), COPD (4%), and UTI (5%). Of patients enrolled in the program 418 (28%) had an ED visit within 30 days, with 272 (18%) had a visit within seven days of program enrollment.

Conclusion: For patients enrolled in the Urgent Dispatch program, 82% did not have an ED visit within seven days and 72% did not have an ED visit within 30 days.

No, authors do not have interests to disclose

182 All Clear! Virtual Reality Defibrillator Training For Medical Students Is Feasible, Liked, and Improves Perceived Knowledge, Comfort, and Skills

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Study Objectives: The primary aims were to determine the feasibility, usability, and likability of a virtual reality (VR) training experience for medical students learning how to operate an in-hospital defibrillator. The secondary aims were to explore the impact of the VR trainer on knowledge and comfort with operating a defibrillator.

Methods: In this cross-sectional study we surveyed 4th-year medical students at a large urban academic medical center before and after exposure to a VR training experience on how to set up and use a defibrillator. Prior to VR training, participants completed a baseline survey of knowledge, comfort, and experience with defibrillator operation, their propensity to motion sickness, and any prior experience with VR. Participants then completed the VR training using an Oculus Quest 2, first in Tutorial Mode and then in Timed Mode. Tutorial Mode guided participants step-by-step in setting up and operating the defibrillator using instructions on a virtual screen and highlighting the relevant virtual objects until the user engaged with that object. In Timed Mode, participants were timed while trying to complete all of the steps needed to set up the defibrillator and deliver a shock to the virtual patient. Participants played in Timed Mode until they achieved mastery of the steps (at least twice) and recorded their best time. After training, participants completed a follow-up survey including a modified system usability scale (6-point Likert scale from "strongly disagree" to "strongly agree") and likability (satisfaction and perceived benefit) of the VR experience. Secondary outcomes of knowledge and comfort with the defibrillator and side effects from VR were also collected.

Results: Twenty-six participants completed the VR training, spending an average of 36.3 minutes (SD = 9.7) to complete both modes. The majority of participants found the VR training easy to use (71% agreed), liked the experience (96% agreed), found it realistic (87.5% agreed), and would recommend it to their peers (96% agreed). Most students (96%) agreed that the training improved their knowledge with how to use the defibrillator. All students (100%) agreed that they were more confident than beforehand in using the defibrillator to cardiovert a patient with cardiac arrest, and that the VR training improved their confidence with using a defibrillator. Self-reported knowledge of how to connect the defibrillator pads to the defibrillator machine increased (from 56% to 87%; $p<0.01$) as well as comfort with using a defibrillator in a cardiac arrest (from 40% to 96%, $p<0.01$). Mean time to defibrillation in VR improved from 106.6 seconds to 67.1 seconds, (mean difference = 38.9 seconds, $p<0.01$). Side effects after the VR experience were commonly reported but considered mostly mild by participants including fatigue (50%) and dizziness (38%).

Conclusion: An immersive VR defibrillator training experience was feasible and well-liked by medical students leading to improved self-perceived knowledge, comfort, and skills with using a hospital defibrillator in a cardiac arrest.

No, authors do not have interests to disclose

183 Evaluation of Increase in Thromboembolism During the COVID-19 Pandemic

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Study Objectives: COVID-19 has been associated with a prothrombotic state suggesting an increased prevalence in thromboembolic events such as pulmonary embolus (PE) and deep venous thrombosis (DVT). Other risk factors of thromboembolic events include prolonged sedentary states which theoretically increased during mandatory stay at home orders during the height of the pandemic. There is little data to compare whether this also increased the rate of overall thromboembolic events in both COVID positive and negative patients during this time. The primary objective was to compare the prevalence of thromboembolic events in those diagnosed with COVID-19 within the previous 6 months of the event versus those without a COVID-19 diagnosis. Secondarily, we assessed the prevalence of thromboembolic (PE/DVT) events during the peak of the COVID-19 pandemic from February 2020 to February 2021 in comparison to the year prior, January 2019 to January 2020.

Methods: This was a retrospective chart review at a single academic medical center, with approximately 64,000 annual ED visits prior to the COVID-19 pandemic. All patients who presented to the ED and diagnosed with a DVT or PE between January 2019 to February 2021 were included. Confirmed COVID-19 infection was equated to positive PCR test in the medical record. Counts and percentages were used to describe patient characteristics; mean and standard deviation (SD) was used to describe age. The chi-square test was used to look at the association of blood clot status and time period. Fisher's exact test was used to look at associations between patient characteristics and COVID-19 period, groups (ie Clot within 6 months of COVID-19 vs. Clot with no history of COVID-19). The independent t-test was used to compare age between the Covid period groups. P-value < 0.05 was considered statistically significant.

Results: There were 64,477 ED patients pre-pandemic (January 2019-January 2020), and 51,890 during the pandemic period (February 2020-February 2021). A total of 2405 patients had a thromboembolic event over the study period, with 1055 occurring in the pre-pandemic phase and 1350 during (1.6% vs 2.6%). There was a statistically significant association between those with a blood clot and positive COVID versus those who were negative (8.6% vs 2.4%, $P<0001$). In addition, there were significant associations of thromboembolic events and COVID amongst the Latino population ($p = 0.02$) and male sex ($p = 0.04$).

Conclusions: This data suggests a statistically significant association between COVID-19 and risk of a thromboembolic event within 6 months of that diagnosis.

No, authors do not have interests to disclose

EMF 184 Implementation of a Novel Fluid Resuscitation Device for the Care of Sepsis Patients: Processes and Perceptions in the Out-of-Hospital Setting

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Study Objective: Early fluid infusion is a key performance metric in the care of sepsis patients, yet this benchmark is often unmet. Emergency Medical Services (EMS) transports one-third of sepsis patients, presenting an opportunity for increased achievement of fluid goals. To enhance sepsis care, one large urban EMS system (~120,000 EMS responses/year) introduced a novel rapid fluid infusion device, LifeFlow® Plus, to its sepsis protocol (~700 patients/year). The study objective is to assess the implementation of this device in EMS fluid administration for out-of-hospital sepsis care.

Methods: Prior to device implementation in January 2022, the EMS system utilized a series of strategies to prepare EMS clinicians for successful device integration into out-of-hospital sepsis care. To assess the success of these implementation strategies and device utilization, an emergent qualitative research design relying on analysis of internal trainings and documentation, pre-implementation survey collection, and active- implementation in-depth interviews will be used. First, ongoing document analysis will assess changes relevant to device adoption in protocol, procedure, and clinician continuing education. The document analysis process collects recorded lectures, protocols, and internal communications from pre-implementation, preparation, and post-implementation phases (Aug 2021- Sept 2022). These data are used in the development of surveys and in-depth interviews. Second, surveys were used to assess early perceptions of system-wide implementation. EMS clinicians were eligible to partake in a survey between Oct-Dec 2021 after completing both asynchronous didactic and in-person skills sepsis training between. The survey response rate was 38% (n=143/376). Members of leadership involved in device integration, education development, or education delivery were eligible to complete a pre- implementation survey between Dec 2021-Jan 2022 (response rate=50%; n=11/22). Finally, in-depth interviews will be conducted between May-Aug 2022. Up to 40 EMS clinicians and leadership members will be interviewed on perceived adoption, acceptability, appropriateness, fidelity, and sustainability of device use in the out-of-hospital setting.

Results: The majority of EMS clinicians believed they could accurately identify (97%; n=127) and adequately care (95%; n=123) for sepsis patients. Additionally, the majority of EMS clinicians intended to use the device in the future (89%; n=116), believed using the device during care was feasible (80%; n=105), and believed the device improved fluid delivery compared to previous methods (74%; n=96). Leadership were confident in EMS clinicians' ability to accurately identify (91%; n=10) and adequately care for (100%; n=11) sepsis patients. Though 100% (n=11) of leadership perceived the device as a superior method of fluid delivery, 27% (n=3) did not feel using the device made care delivery easier. EMS clinician interviews will provide qualitative data on experience with sepsis care management and device utilization. Leadership interviews will focus on implementation process experiences and expectations.

Conclusions: These findings will highlight system-wide preparation for a novel rapid infusion device implementation, EMS clinician utilization of this device, and frame the quantitative evaluation of device effectiveness. Lessons learned will be drawn for future EMS device and protocol implementations.

No, authors do not have interests to disclose

185 Identification of At-Risk Patients in a Statewide EMS "Naloxone Leave Behind" Program

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Study Objectives: Naloxone Leave Behind (NLB) programs are an effective intervention Emergency Medical Services (EMS) can utilize to expand access to naloxone and reduce opioid overdose deaths in high-risk patients with opioid use disorder (OUD). Identification of "At-Risk" persons, patients who experience an opioid-related overdose or have indicators of OUD, is critical for successful program implementation. While many EMS systems have implemented NLB programs, few have reported on program success or areas for improvement. We assessed the ability of practitioners in a statewide EMS program to 1) identify patients "At-Risk" for OUD, and 2) distribute NLB kits to "At-Risk" patients.

Study Design: This was a cross-sectional observational study of EMS encounters during the first year (October 1, 2020-September 30, 2021) of a statewide NLB program. EMS practitioners were trained using online modules to identify "At-Risk" patients and instructed to document these findings in a NLB protocol specific section of the patient care report. Criteria EMS used to identify "At-Risk" patients included patient confirmation of drug use, concern expressed by family or others on scene, presence of drug paraphernalia, or clinical signs and symptoms. EMS records were abstracted from the Statewide Incident Reporting Electronic Network (SIREN). All EMS responses to 911 calls were analyzed. Patients dead on scene were excluded. Patients were post-hoc considered "At-Risk" if EMS documented risk via the NLB protocol or if the patient met protocol considerations. Considerations included: receiving out-of-hospital naloxone, working diagnosis or chief complaint mentioned opioids, or EMS documented signs of drug use or paraphernalia or use of the overdose protocol.

Patients post-hoc identified as "At-Risk," who did not have a recorded NLB offer or discussion by EMS were considered "missed." The number and rates of post-hoc and EMS identified "At-Risk" patients were compared. Descriptive and regression analysis were performed.

Results: A total of 106,513 911 EMS responses were analyzed. Of these, 2,504 (2.35%) met post-hoc "At-Risk" criteria for OUD. "At-Risk" patients were (57.02%) male, had a median age of 41, and 22.48% received out-of-hospital naloxone. Among non-transported "At-Risk" patients (n=793), the NLB protocol was utilized in 407 (51.3%) encounters: 141 of those patients (34.73%) were offered a NLB kit. Among protocol- determined "At-Risk" patients who were initially offered but not given a kit (n=37), the recorded reasons were: EMS did not feel patient at sufficient risk (n=12, 32.43%), patient already has a kit (n=8, 21.62%), decision left to hospital (n=8, 21.62%), patient refused kit (n=7, 18.92%), patient denies use (n=1, 2.70%), other (n=1, 2.70%). Logistic regression found that younger (10-year OR 0.85, 95% CI 0.74; 0.97), naloxone-treated (OR 1.95, 95% CI 1.14; 3.33), and suspected-overdose (OR 2.88, 95% CI 1.87; 4.44) patients were more likely to be offered a NLB kit by EMS practitioners.

Conclusion: Nearly fifty percent of "At-Risk" patients were not identified by EMS using the NLB protocol. Of patients who were identified, the majority (65%) did not receive a NLB kit. These findings highlight the need for additional interventions to improve both EMS identification of "At-Risk" patients and increase the rate of NLB kits offered to those who are identified.

No, authors do not have interests to disclose

186 Rethinking Emergency Department Clinical Guidelines for Use at the Bedside

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Study Objective: Despite the benefits of clinical guidelines as evidence-based workflows that improve care, emergency departments (EDs) often have low and variable rates of clinical guideline utilization. At our institution - an urban, safety net, academic-affiliated Level I trauma center - fewer than one user per week accessed clinical guidelines on our ED's legacy cloud-based system between October 2019-October 2020. Our team's objective was to utilize a design-thinking approach to improve clinical guideline design and accessibility, with the goal that this intervention would ultimately increase clinical guideline utilization in the ED.

Methods: Our team utilized a design-thinking process, ranging from empathizing with stakeholders to prototyping and optimization, as the foundation for our approach to improve access to clinical guidelines. We combined a deep literature review with input from institutional design experts and interviews with end-users to create a streamlined, standardized approach to clinical guideline design and implementation (Table 1). We employed several key design principles to redesign our clinical guidelines: left-to-right flow, standardized colors indicating order of priority and urgency, visual information limited to a single page, concise information where possible, standardized spatial positioning & flowchart symbols (arrows, boxes, etc), consistent backgrounds, and downloadable templates. We utilized free technology like Google Slides to convert 66 clinical guidelines - which included over 300 pages of text-heavy, non- standardized information - into our newly-designed guideline templates. After uploading the guidelines to a new open-access digital information hub (edrive.ucsf.edu), we tracked guideline usage through Google Analytics and conducted IRB-approved surveys (Dec 2020 and Dec 2021) to assess satisfaction and usage.

Results: While our previous legacy cloud folder system averaged 0.13 users per day, over 43 users per day accessed clinical guidelines on our new digital platform in January 2022, representing a 330-fold increase in access. From 2020 to 2021, the proportion of ED clinicians who "Strongly Agreed" that our information hub and standardized clinical guidelines help them do their job more efficiently increased from 28% to 58% (p=0.0044). Additionally, 98% of clinicians reported that they found the single-page guideline flowcharts easier to understand and apply on-shift than prior multi-page text documents.

Conclusions: By identifying and addressing key design barriers to clinical guideline utilization in the ED, our team created an adaptable process that significantly increased clinicians' access and satisfaction with clinical guidelines. Other institutions can create similarly impactful guideline designs by using low-cost technologies and employing key design-thinking principles.

Table 1: Commonly encountered clinical guideline barriers and strategies for improvement.

Clinical Guideline Barrier	Improvement Strategy
Complex and difficult to read/use	Standardize guidelines using design-thinking principles to a single-page, easy to read flow sheet without extraneous links
Not from a trusted source	Engage a group of clinicians and department leadership to develop and review guidelines
Lack of robust evidence base	Re-develop guidelines to include credible sources and cross-collaboration with multiple specialties
Low clinician awareness	Employ multi-pronged publicity strategy, such as emails, posters, and multimedia
Difficult to access	Develop an open-access, centralized digital information hub to house clinical guidelines, accessible from any computer, table, or mobile device (e.g. E^{3}Drive, accessible at edrive.ucsf.edu)
Lack of interdisciplinary collaboration	Re-develop guidelines with an interdisciplinary team and integrate other department leaders into the change control process
Financial constraints	Use out-of-the-box web technology - such as Google Slides and the Drupal web-building platform - to create user-focused clinical tools at a very low cost
Unresponsive to clinicians' needs	Utilize rapid-cycle end-user feedback to make real-time improvements to the clinical guideline standardization process throughout the development and maintenance phases
Lack of a change-control process	Create a clinician-led update team that follows a standardized change control process to ensure consistency and reliability

Yes, authors have interests to disclose
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Disclosure: FujiFilm-SonoSite
Consultant/Advisor
FujiFilm-SonoSite

187 Association Between Regional Socio-economic Status and Mechanical Thrombectomy for Acute Ischemic Stroke: A Nationwide Multilevel Observational Study

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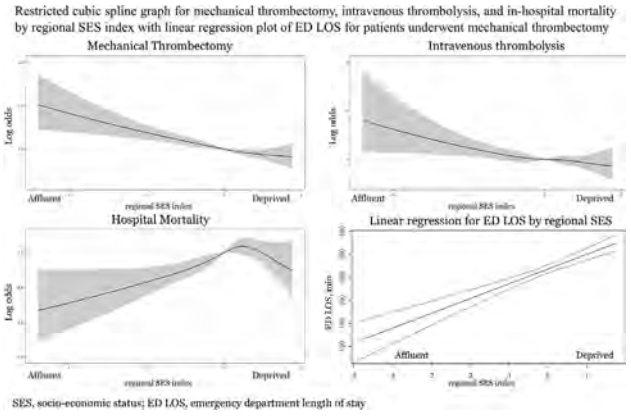
Study Objective: Acute ischemic stroke is one of the major health burdens worldwide and mechanical thrombectomy is a treatment of choice. This study aimed to evaluate the association between regional socioeconomic status (SES) of patient and whether mechanical thrombectomy was conducted in acute ischemic stroke visited emergency department (ED).

Methods: A nationwide cross-sectional study was conducted using the national emergency department database in South Korea. Ischemic stroke who visited ED within 24 hours from symptom onset between January 2018 and December 2019 were enrolled. The main exposure was regional SES index, which was calculated and standardized from property tax per capita and regional proportion of low education level, single family, single-parent household. Study groups were categorized by quarters of index: Affluent (<-0.43506), Affluent- middle (-0.43506～0.12286), Deprived-middle (0.12287～0.6291), and Deprived (>0.6291). The primary outcome was whether mechanical thrombectomy was performed. Multivariable logistic regression with multi-level analysis was conducted to calculate the adjusted odds ratio (OR) and 95% confidence intervals (CIs). Interaction term of altered mentality was added to evaluate the effect modification by mental status of patient at the ED triage.

Results: Among study populations, 1,225 (5.2%) patients received surgery in the Affluent group, 1,215 (5.2%) in the Affluent-middle group, 1,042 (4.3%) in the Deprived-middle, and 1,061 (4.6%) in the Deprived group. In main analysis, we found that Deprived-middle and Deprived groups are less likely to receive mechanical thrombectomy compared to the Affluent group; adjusted OR (95% CIs), 1.00 (0.96-1.04) for Affluent- middle, 0.78 (0.69-0.88) for Deprived-middle, 0.85 (0.68-1.06) for Deprived. Altered mentality at the entrance of ED strengthen the association in the

Deprived-middle group; adjusted OR (95% CIs), 0.80 (0.72- 0.89) for alert mental status, 0.73 (0.66-0.81) for altered mentality (p-value for interaction < 0.05).

Conclusions: We found a significant association between regional SES and whether mechanical thrombectomy was conducted in acute ischemic stroke. Improvement of emergency medical system and clinical protocol are needed to resolve health care disparities.



SES, socio-economic status; ED LOS, emergency department length of stay

No, authors do not have interests to disclose

188 "I'd Rather See Action": Application and Recruitment Experiences of Underrepresented in Emergency Medicine Trainees

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Study Objectives: The emergency physician workforce is largely comprised of white males. Despite recruitment efforts over the last decade, there has not been a significant increase of trainees underrepresented in emergency medicine (URiEM). Prior studies have focused on institutional strategies to improve diversity, equity and inclusion (DEI), yet studies have been limited in describing the perspective of URiEM trainees. We sought to assess URiEM perspectives on DEI in the residency application process, the recent surge in academic EM residencies' efforts related to DEI, and suggestions on future directions.

Study Design/Methods: This study was conducted at an urban academic medical center in the United States from November 2021 – March 2022. For the purposes of the study, we defined URiEM as women, people of color and other minority social identities. URiEM junior residents who had participated in a virtual interview season after the summer of 2020 were invited to participate in individual 20-30 minute semi-structured interviews. Interviews focused on experiences of residency application and recruitment processes specifically related to DEI. Interviews were digitally recorded and transcribed. Transcripts were iteratively reviewed to generate a codebook using a deductive approach, in which the researchers used pre-defined areas of interest to categorize responses (related to desired features in a residency program and experiences of DEI in the application process). Subsequently, the researchers used an inductive approach to elicit dominant themes within each category, based on repeated patterns and meanings, through consensus discussions. Thematic saturation was reached after 8 interviews, indicating adequate sample size.

Results/Findings: Ten residents participated in semi-structured interviews. Three identified as female and seven as male. Six identified their race/ethnicity as Black, 1 as Hispanic, 2 as Asian, and 1 as Middle-Eastern. Four identified as immigrants and three as first-generation. Three dominant themes emerged relating to authenticity, representation, and being othered. Interviewees assessed the authenticity of a program's DEI efforts by evaluating the timeframe and scope of such efforts (eg pre-summer 2020, outside of the recruitment season) as well as how current URiEM students felt supported. Participants reported a desire for presence and representation of other URiEM colleagues in a residency program and training environment, including among faculty and nursing. Interviewees described interactions with residency leadership that indicated interest in their application based on their URiEM status or potential to lead DEI efforts within the residency program; interviewees wished to be seen as learners first rather than directing departmental DEI efforts.

Conclusion: URiEM residents value authenticity in DEI efforts, representation, and being seen as learners first when assessing residency programs during the interview season and match. Programs seeking to recruit URiEM residents should be open about their current state of DEI in their department, present their multi- pronged and thoughtful DEI efforts, and showcase how their program will contribute to an applicant's professional development.

No, authors do not have interests to disclose

189 Emergency Department Clinician Perspectives on a Pilot Emergency Department-Based Expedited Partner Therapy Program: A Qualitative Study

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Study Objectives: Sexually transmitted infections (STIs) have increased dramatically in the US over the past decade, with emergency departments (EDs) a key setting of care. Expedited partner therapy (EPT), the practice of treating a patient's sexual partner without an evaluation of the partner, is effective at controlling STI spread and preventing recurrent infections. Despite these advantages, little is known about how to effectively implement EPT into ED practice. The purpose of this study was to examine ED clinician perceptions of EPT, perceived barriers and facilitators towards use, and ED implementation.

Methods: We conducted a qualitative analysis of ED clinicians who participated in a feasibility pilot intervention to promote use of EPT. The intervention consisted of an electronic health record (EHR) orderset linked with a best practice advisory (BPA) alert to facilitate EPT use at a large, urban, academic center in the Midwestern US. The orderset allowed EPT to be offered via paper prescriptions or take-home medication kits and included a BPA that promoted clinicians to consider EPT, triggered when both STI tests and STI antibiotics were ordered. Medication kits were donated by the state department of health. In parallel to the intervention, we performed telephone interviews of ED clinicians (attending/resident physicians, physician assistants (PAs), and nurses) who cared for patients empirically treated for STIs between August-October 2021. The interview guide was developed from the Consolidated Framework for Implementation Research (CFIR). During interviews, researchers paraphrased participant responses or transcribed quotes verbatim. Data were analyzed using a rapid assessment method that included coding data immediately following each interview according to a CFIR-based coding scheme. Codes were iteratively added to reflect new ideas not included in the a priori coding scheme. Two reviewers independently evaluated the coded data to identify patterns while a third reconciled any discrepancies.

Results: We interviewed 20 ED clinicians: 11 attendings, 5 residents, 2 PAs, and 2 nurses. Participants were knowledgeable about EPT, viewed it as effective, and supported its availability. Perceived barriers included patients no longer having contact with the partner, time constraints related to educating patients, concerns about adverse medication effects, and clinician unfamiliarity with the EPT process, particularly pharmacists. Participants viewed EPT as less impactful in EDs with a lower volume of STI visits. Among clinicians who ordered EPT, a noted facilitator was the ease of finding and navigating the EPT EHR order set. Participants preferred take-home medications over paper prescriptions due to the fewer number of steps required for the partner to be treated. While several participants stated that they generally disliked BPAs, the majority still supported an EPT BPA because of its perceived effectiveness in encouraging use during early adoption. When asked how to implement ED EPT, almost half of participants suggested using a BPA.

Conclusion: In this single institution feasibility pilot study, ED clinicians reported a high understanding of EPT. They viewed the EPT orderset and BPA as useful but noted that barriers to EPT were the time needed to educate patients and clinician unfamiliarity with EPT. Future research should examine patient perspectives and preferences on ED EPT and ways to sustain provision of take-home medication kits.

No, authors do not have interests to disclose

190 Spontaneous Echo Contrast in Out-of-Hospital Cardiac Arrest: Measurement of Agreement and Incidence

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Study Objectives: Spontaneous Echo Contrast (SEC) is visible swirling of blood within cardiac chambers or blood vessels. It has been described intracardiac during low flow states but there has been limited research on SEC in cardiac arrest.

Study Design/Methods: Retrospective review of prospectively collected data from a 20-site multicenter trial in out-of-hospital cardiac arrest. We performed a blinded review of digitally recorded TTE images obtained during cardiac arrest. Only the initial echo performed during a previously published 20 site multi-center study were included. Two experienced emergency physicians reviewed the echo for the presence of SEC. SEC was defined as 1) visible movement of blood within the cardiac chamber or 2) increased echogenic blood within cardiac chamber. Data included the presence and location (cardiac chamber) of SEC, type of SEC. Echo images were separately reviewed for the presence of cardiac activity in a blinded fashion. Agreement between reviewers was assessed using Kappa statistics. Differences in interpretation were adjudicated to give final data on location of SEC. Data is presented as mean, 95% CI. Comparison between groups with Fischer's Exact.

Results/Findings: 450 patients presenting in cardiac arrest underwent bedside TTE and were included in the analysis. Overall, 18% of patients demonstrated SEC, 5% with visible movement of blood and 13% with hyperechoic blood. Agreement between reviewers was moderate with a kappa of 0.58 (95% CI 0.49-0.66). Of those patients where a specific cardiac chamber was visualized, the most common location for SEC was right atria (20%) but SEC was seen in all chambers; Right Ventricle (18%), Left Atria (5%), Left Ventricle (6%). SEC was more commonly visualized when there was no cardiac activity (25% vs 16%, p=0.048).

Conclusion: Agreement between experienced emergency physician on visualizing SEC is moderate. This is most likely due to the range of quality in echo images during cardiac arrest. When present, SEC was most commonly seen in the right atria but could be seen in any chamber.

No, authors do not have interests to disclose

191 Physician Misidentification in the Emergency Department

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Study Objective: A prior study performed based on patient surveys at this same institution showed a relatively high female physician recognition rate that did not correlate with the day-to-day experience of female physicians. Therefore, this study was performed to evaluate the prevalence of role misidentification from the physician perspective. The primary objective was to determine if there were any significant differences in role misidentification based on sex. The secondary objectives were to determine if the presence of a red badge that signifies 'DOCTOR' significantly changes the rate of misidentification and if there were any significant differences based on post-graduate year (PGY).

Study Design/Methods: This was a prospective study performed at a single, large academic medical center. All physicians working in the emergency department at the time that the study was being performed were asked to participate. All participants were asked to fill out a survey after each shift, regardless of if they had been misidentified, to document if they were misidentified within their role while on shift. Participants filled out surveys for two weeks while wearing standard badges and then two additional weeks while wearing large, red 'DOCTOR' badges. This was performed in two separate four week periods correlating with resident blocks to ensure that the same participants were in the emergency department for both halves of the study.

Results/Findings: There were a total of 60 survey responses with standard badges and 32 responses with 'DOCTOR' badges. The data was entered into JASP (JASP Team (2022). JASP (Version 0.16.2) [Computer software]) for statistical analysis. Data was not normally distributed for any variable (Shapiro-Wilk <0.001 for presence of badge, sex, and PGY year). Welch's t-test was then used to compare groups before and after badge intervention. In regards to the primary outcome, the data showed that females were more likely to be misidentified as a non-physician than males ($p<0.001$). In regards to secondary outcomes, there was no statistically significant change in rate of misidentification with the addition of 'DOCTOR' badges (p=0.284) and post-graduate year also had no correlation to the rate of misidentification (p=0.947).

Conclusion: This study showed that female physicians were significantly more likely to have their role misidentified than their male counterparts. This has been shown in additional studies as well and red 'DOCTOR' badges have therefore become commonplace in many emergency departments with the hope of decreasing physician misidentification, specifically among physicians that identify as women. However, this study showed that the presence of 'DOCTOR' badges did not significantly change role misidentification and therefore may not be helpful in improving appropriate female physician identification. A 2021 study showed the increased rate of female physician misidentification led to decreased job satisfaction and, therefore, continued female physician misidentification could lead to professional ramifications. Further studies should be performed in the future to continue to identify causes of and solutions to the significant sex-related difference in physician recognition.

No, authors do not have interests to disclose

192 Using the Electronic Health Record to Identify Patients Presenting to the Emergency Department at Highest Risk for Subsequent Overdose

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Study Objectives: The emergency department (ED) is frequently the primary point of entry into the health care system for patients with opioid use disorder (OUD), with acute ED presentations including acute overdose (OD), withdrawal, and the medical and psychiatric complications of OUD. Each subsequent OD increases the risk of death. Strategies to best identify patients at highest risk for subsequent OD can lead to improved utilization of ED-based interventions such as medications for opioid use disorder (MOUD), naloxone kits, and ED-based peer supporters providing linkage to treatment. The purpose of this study was to utilize the electronic health record (EHR) to identify patients at the highest short-term risk for a subsequent non-fatal or fatal opioid OD within 90 days.

Methods: This was an IRB-approved retrospective analysis of patients from November 2017 through December 2020 presenting to a large urban Midwestern ED with an acute presentation of OUD by ED encounter diagnosis. The EHR was then further used to identify possible high-risk variables for subsequent OD available prior to the index ED presentation. Variables were then compared in patients who had a subsequent 90-day OD (defined by ED encounter for OD or opioid OD death by coroner) vs. patients without a subsequent 90-day OD. Statistical comparisons were made using Fishers Exact test or Students T-test when required.

Results: There were 1676 patients presenting to the ED with acute presentation of OUD. Of these, 110 had a subsequent 90-day OD. The following were positively correlated with a subsequent 90-day OD: A prior OD within the last two years (27% vs 16%, $p<0.001$, requiring Narcan in the ED (16% vs. 8% p=0.01), and history of another substance abuse history (p=0.053).

Conclusion: The EHR can aide in the identification of patients who are at high risk for a short-term subsequent OD. Identifying patients at high risk can lead to an increased utilization of ED-based programs and potentially decreased subsequent opioid ODs.

No, authors do not have interests to disclose

193 The Incremental Value of Sex in Addition to the History, Electrocardiogram, Age, and Risk Factors (HEAR) Score and High-Sensitivity Cardiac Troponin for 30-day Major Adverse Cardiac Events

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Study Objectives: Sex-based differences have increasingly been acknowledged in the manifestation and presentation of acute coronary syndrome (ACS). The History, Electrocardiogram, Age, Risk Factors, (HEAR) and Troponin (HEART) cardiac risk stratification score is the only widely-used cardiac risk stratification score that does not include sex. Our objective was to evaluate the incremental value of sex in addition to the HEAR score and high-sensitivity cardiac troponin T (hs-cTnT) for the prediction of 30-day and 1-year major adverse cardiac events (MACE).

Methods: We conducted a prospective, multicenter, observational study of adult ED patients with suspected ACS in the United States and United Kingdom. Demographic and clinical data, including hs-cTnT results, were directly extracted.

HEAR scores were collected from the treating physician or calculated retrospectively. Our primary and secondary outcomes were MACE 30 days and 1 year, respectively. MACE was defined as acute myocardial infarction, revascularization, or cardiac death. We fit a series of multivariable logistic regression models. The base model included HEAR score and initial hs-cTnT. Further models included sex and interaction terms for sex with HEAR score and/or initial hs-cTnT. Models were compared using likelihood ratio (LR) tests, Akaike's information criterion (AIC), and Bayesian information criterion (BIC).

Results: We studied 3,752 patients; 1,941 (52%) were male, and median age was 60 (49, 71) years. MACE at 30 days occurred in 330/3,752 (9%), and MACE at 1 year occurred in 559/3,193 (15%). Sex did not have incremental value for the predication of 30-day or 1-year MACE when evaluated purely as a main effect [OR 1.2 (95% CI 0.9-1.6) and OR 1.0 (95% CI 0.8-1.3), respectively]. However, models that included sex with interaction terms added incremental value for the prediction of 30-day but not 1-year MACE compared to the base model without sex (Table).

Conclusion: The models with sex and interaction terms for sex outperformed the base model that did not account for sex in predicting 30-day MACE. The impact of sex is to modify the associations of HEAR score and hs-cTnT with these outcomes. Clinicians should consider sex-specific guidelines for applying HEAR score and hs-cTnT to ED patients with suspected ACS.

Table. Multivariable logistic regression model results.

	30-day MACE			1-year MACE		
	LR Chi^2 p-value	AIC	BIC	LR Chi^2 p-value	AIC	BIC
Base model	(ref)	1612	1631	(ref)	2431	2450
Sex main effect	0.17	1612	1637	0.80	2433	2458
Sex/HEAR interaction	0.11	1612	1643	0.94	2435	2466
Sex/hs-cTnT interaction	<0.001	1599	1630	0.05	2429	2460
Sex/HEAR & sex/hs-cTnT interactions	<0.001	1597	1634	0.10	2431	2468

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Alphi Phi Foundation Heart to Heart Award

194 Discordance of Pneumonia Diagnoses from Admission to Discharge: A Retrospective Cohort Analysis of 118 Veterans Affairs Emergency Departments

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Study Objectives: The diagnosis of pneumonia in the emergency department (ED) is often uncertain, however to our knowledge the impact of this clinical uncertainty has not been studied. We examined the prevalence of and outcomes associated with changes in pneumonia from time of ED admission to time of hospital discharge, termed diagnostic discordance, among patients hospitalized at 118 US Department of Veterans Affairs Medical Centers.

Study Design and Methods: This retrospective cohort study of emergency department encounters resulting in hospitalization from 1/1/2015 -4/30/2021 utilized a previously validated approach that combines diagnostic coding with natural language processing of clinical notes to capture a diagnosis of pneumonia at (1) time of admission and (2) time of discharge. Using a two-by-two contingency table with the initial diagnosis as the "test" and discharge diagnosis as an imperfect reference standard, we categorized each initial diagnosis as "true positive" (TP), "true negative" (TN), "false positive" (FP) and "false negative" (FN). We calculated the prevalence of FP and FN cases and calculated crude rate of inpatient, 7-day, and 30-day mortality, along with ward-to-ICU transfer within first 72 hours. For each discordant group, we compared observed outcomes to expected outcomes estimated from logistic regression models using 49 patient factors to capture baseline characteristics and clinical illness severity as predictors.

Results: Among 2.2 million hospitalizations from the ED, 336,102(15%) received a diagnosis of pneumonia, 231,707(10.5%) received an initial diagnosis, and 238,210 (10.8%) received a discharge diagnosis of pneumonia. Of the encounters with a diagnosis [AC1] of PNA at either time point, diagnostic discordance was found in 202,287 (60%) of encounters. Following an ED diagnosis of PNA, 97,892 encounters (42.2%) were found to be a false positive. Among those encounters with a discharge diagnosis of PNA, 104,39 encounters (43.8%) were a false negative at time of ED admission. Patients with FP or FN diagnoses had more comorbidities, presented with higher severity of illness, and had higher 7-day, inpatient, and 30-day mortality and ward-to-ICU transfers (Table 2) that exceeded the expected rates based upon patient factors.

Conclusion: Discordances between ED and discharge diagnoses occurred in over half of all patients with pneumonia and were associated with worse outcomes that were not explained by patient characteristics and illness severity. Both false positive and false negative discordances demonstrated worse than expected outcomes. Recognition and research of diagnostic discordance at the system, provider, and patient levels could be a powerful way to create new paths to improvement in diagnosis and outcomes for patients with pneumonia.

	False negative Discordance		True Positive	False Positive Discordance		True Negative
Total N	104,395		133,815	97,893		1,867,063
	Observed	Expected	Observed	Observed	Expected	Observed
Inpatient mortality	7.3%	5.8%	5%	3.3%	2.6%	1.2%
7 day mortality	3.9%	2.7%	2.6%	2.1%	1.8%	1%
ICU care within 72 hours	8.8%	6.1%	5.2%	4%	4.7%	2.7%
30 day mortality	13.3%	10.9%	10.3%	8.1%	6.9%	3.9%

No, authors do not have interests to disclose

195 Satisfaction of Patients With Emergency Care Services Received in Sub-Saharan Africa: A Systematic Review

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Study Objective: Patient experience with emergency care (EC) is a rapidly expanding area of research for health care policy leaders in emergency medicine in high income countries (HICs). Prior studies conducted in HICs have demonstrated a correlation between a positive EC patient experience and improved patient outcomes, profitability, and other health care system objectives and have identified several key drivers of patient experience including provider–patient communication, EC service wait times, provider empathy, and provider medical competence. However, there is a paucity of research addressing EC patient experience in Sub-Saharan Africa (SSA). We conducted a systematic review to identify key predictors of patient satisfaction with EC in SSA, to summarize how patient experience with EC has been measured in the SSA context, and to evaluate interventions aimed at improving patient experience with EC in SSA.

Methods: A systematic search in Ovid MEDLINE, PubMed, Embase, Scopus, Web of Science Core Collection, Africa-Wide Information, and CINAHL from inception to September 2021 was conducted of Sub- Saharan Africa based publications using key search terms for "emergency department," "patient experience," and "patient centered care." Specifically, publications were included if they examined patient experience with EC care in SSA and were written in English. Titles, abstracts, and full texts of eligible articles were independently evaluated by two reviewers and vetted by a third. We extracted and synthesized results using a thematic analysis approach. The study is registered at PROSPERO (CRD42021278411).

Results: A total of 12 studies met inclusion criteria. The majority of studies were conducted in Nigeria (n=4, 33%) and Ethiopia (n=3, 25%) with further studies originating from South Africa (n=2) Tanzania (n=1), Ghana(n=1), and Botswana (n=1). The most commonly identified drivers of patient experience with EC included

drug shortages, adequate supplies and essential medical equipment, cost of care, privacy, wait times, failure of the health worker to discuss the expenses for treatments, patient perceived discrimination, patient educational status, and patient perceived staff empathy; however, existing literature is limited. No studies evaluated interventions aimed at improving patient experience with EC in SSA and only two studies used a previously validated survey tool.

Conclusions: Limited data exists describing key drivers of patient experience with EC in SSA and no studies evaluated interventions aimed at improving patient experience with EC in SSA. As enhanced patient experience with EC has been demonstrated in HICs to correlate with improved patient health outcomes, further research is needed to identify key drivers of patient experience with EC and determine what interventions may be successfully implemented in SSA to improve the quality of EC provided and allow for comparison of health system strengthening efforts and resource distribution.

No, authors do not have interests to disclose

196 An Infographic Utilized as a Just-In-Time Tool for Paramedic EKG Interpretation

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Study Objectives: Just-In-Time (JIT) training is a newer style of learning which allows rapid on-site practice followed by immediate application. JIT can be used in simulation training, at the bedside just prior to clinical opportunities or in the field such as the out-of-hospital setting. The purpose of the study was to determine the utility of using infographics as JIT for paramedics to deliver more efficient and effective patient care prior to arrival to the emergency department. We hypothesize that the use of an infographic displaying interpretation and management of arrythmias in accordance with Osceola County, Florida protocols will allow paramedics to deliver timely and accurate patient care in the moments leading up to emergency department arrival. To current date, no literature has been published on the utility of JIT in the out-of-hospital setting with implementation into paramedic field training.

Study Design/Methods: The study group consisted of 58 paramedics within the Kissimmee Fire Department at various levels of training. The study was explained to each subject, and consent was obtained. The study consisted of a pre-test and post-test with infographic. The study took place within the fire and rescue stations. The pre-test and post-test were identical, consisting of nine-teen real life scenarios regarding interpretation and management of various arrythmias. The pretest was taken without assistance and the post-test was taken shortly after with use of the infographic. A unique code created by each subject was used to match pre-test to post test results. Each test was given a total score and pre-test was compared to post-test scores. Standard deviations were calculated from data. A post study survey was conducted to determine utility of the infographic.

Results: 58 study participants completed both pre-test and post-test. Average scores of the pre-test displayed (10.32 +/- 4.45) out of 19 and post-test displayed (13.01 +/- 4.31) out of 19. The study showed there was a 26% increase in test scores after the use of an infographic. Post study results on a Likert scale of (1-5) resulted in a 32% increase in comfort level of both interpretation and management of arrythmias after the use of an infographic tool. Study subjects also reported they were likely to use the infographic on shift and would recommend to others.

Conclusion: It was shown that using a Just-In-Time learning tool had meaningful implications in real life problems. The infographic allowed study participants to more accurately interpret and manage a study consisting of real-life scenarios. As a result, having an infographic alongside paramedics during rescue calls may have underlying value for increased patient care and safety.

No, authors do not have interests to disclose

197 Deep Learning-Based Scoring of Pulmonary Congestion for BLUSHED AHF Trial

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Study Objectives: Point-of-care ultrasound (POCUS) offers real-time data to guide clinical decision- making and patient care. Despite having advantages over alternative imaging studies such as computed tomography or magnetic resonance imaging, performing POCUS requires technical expertise for image acquisition and interpretation, thereby limiting its use for many clinicians. Deep learning technologies can provide automated interpretation of POCUS images thus making POCUS accessible to even novice users. The goal of this study was to determine the ability of a deep learning algorithm to grade the severity of lung ultrasound (LUS) B-lines in patients with acute heart failure (AHF) when compared to expert reviewers.

Methods: Deep learning model based scoring was applied to 6,432 LUS videos from 130 patients previously enrolled in the BLUSHED AHF trial. Videos were acquired using an 8-zone scanning technique and obtained on patients at multiple assessment time points throughout hospitalization. The deep learning model was trained from a separate dataset by ultrasound-trained faculty at a different institution. An ensemble of five deep neural networks (EfficientNet-b0 with U-Net decoder) were trained to predict all locations in a single frame where a B-line originated from the pleura. A B-line severity score was assigned to every clip by totaling the number B-lines located by the model divided by the number of frames per clip. This was then compared to two blinded LUS experts who independently quantified the total B-lines for each lung zone through a previous dataset. Further, both the deep learning model and expert B-line severity scores at the point of ED disposition were then compared against ED disposition location, hospital length of stay, and readmission rate at both 7 and 30 days. A spearman correlation test was then performed to determine the correlation between the model and each expert as well as the severity score and clinical parameters.

Results: Comparison of the deep learning model-based scoring to expert quantification found a Spearman rank correlation of 0.85 for expert 1 and 0.84 for expert 2. The highest correlation values were in the anterior lung zones for both experts (0.88,L1; 0.88 R1) and (0.86, L1; 0.86, R1). There was no correlation between the deep learning model and ED disposition, length of stay nor readmission rates. There was a correlation between experts and hospital length of stay (expert 1: $r=0.19$, $p=0.03$, and expert 2: $r=0.17$, $p=0.05$).

Conclusions: A deep learning model when applied to an external dataset of prospectively enrolled patients with AHF had strong correlation when compared to expert B-line quantification. The deep learning model's severity score did not correlate to specific clinical parameters. Expert quantification of B-lines at the time of ED disposition did correlate to hospital length of stay. As the deep learning model is further refined from future datasets, it is possible that the model will help predict similar clinical parameters.

No, authors do not have interests to disclose

198 Rapid Resuscitation for Hemorrhagic Shock: Hemodynamically Unstable Patients May Do Better Than Those Presenting with Normal Vitals

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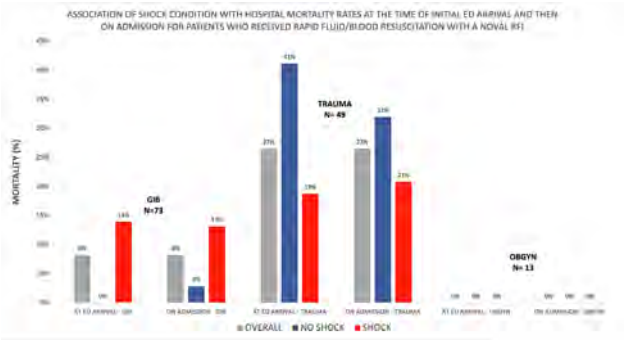
Study Objective: Early damage control resuscitation is the current standard for trauma and other hemorrhagic shock conditions. In 2017 a manual novel rapid fluid infuser (RFI) was added to the toolbox for managing the continuum of critical patients at this large urban-suburban Level 1 trauma health center. This study describes the emergency department experience with the RFI as it has been used for patients with hemorrhagic shock. The primary goal was to gather this data to inform QI initiatives around rapid response, maternal hemorrhage, and trauma.

Methods: A retrospective cohort included all patients from January 2017 - April 2022 with hemorrhagic conditions having received rapid delivery of fluid/blood through LifeFlow®, a manual fluid infusion device, in one of 6 EDs the health system. An electronic search strategy using patient care and administrative data, identified patients with use of the RFI in the ED. Patients were categorized by hemorrhage etiology using the Clinical Classification Software Refined (CCSR) 2021.2 for all ICD10CM diagnoses in the patient record. Descriptive measures are presented with important subgroups and based on the presence of shock and type of hemorrhage. Chi-square and Wilcoxon signed-rank test were used for subgroup comparisons.

Results: Of 1404 patients identified to have had the RFI used in their care, 139 patients (27 patients < 18yrs) were identified with serious hemorrhage. Median age was 51.4 (IQR 25.0-66.1), 54.7% male, 51.8% white, 31.7% Black. EMS transported 57.6%; with ESI- 1 40.2% and ESI-2 44.7%. Patients were from home 57.0%, accident site 21.6%, health care 12.1%, and SNF/ALF 5.2%. Initial vitals indicating shock (shock index (SI) >0.9 or SBP<90) were present in 63.3%; 74.1% had ED recorded shock vitals, and 51.1% had persistent shock on ICU admit. Hemorrhage source was gastrointestinal (GI) 52.5%, trauma 35.3%, (including 22 patients with intracranial hemorrhage), gynecologic-obstetric (OBGYN) 9.4%, and other 2.9%. Median volume delivered within 3hrs of RFI use was 2090mL (IQR

948-3114). Patients requiring vasopressors within 3hrs 28.8%, blood products within 24hrs 73.4%. Patient outcomes included ICU admit 75.5%, ICU LOS 2.8 days (IQR 1.3-7.4), hospital LOS 4.9 days (IQR 2.1-11.4). Hospital mortality was 14.4% overall, with trauma and GI mortality 26.5% and 8.8% respectively; one death for "other", no deaths in the OBGYN group. Anticipated were the within-patient improvements in vital signs seen before and after the RFI use, with no adverse events attributable to the RFI reported. The device usage is variable across the multiple EDs, being most used at the combined trauma center and children's hospital (61.7%). An unexpected finding from the subgroup analysis revealed that for traumatic hemorrhage, patients who presented hemodynamically stable had a higher death rate (Figure 1). This may be attributable to the limits of an observational design; however, a plausible explanation would be that patients who do not receive a full press on arrival may be more likely to have delayed recognition and response to subsequent deterioration.

Conclusions: Study findings reveal that only the sickest of patients are being managed with the assistance of the RFI. Our analysis reveals variation in the temporal use of the device, and an opportunity to develop QA initiatives around the biggest use cases: trauma, GI and maternal hemorrhage.



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199 Heart Rate Entropy Predicts Impending Rearrest Due to Ventricular Tachycardia/Fibrillation but Not Pulseless Electrical Activity

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Background: Cardiac rearrest after successful return of spontaneous circulation (ROSC) is a significant barrier to successful resuscitation, making it a high priority for emergency care research. Rearrest is commonly due to ventricular tachycardia/fibrillation (VT/VF) or pulseless electrical activity (PEA), each with different, yet poorly understood mechanisms. In general, heart rate variability (HRV) has been associated with long-term risk of primary VT/VF, related to altered autonomic tone; however, its association with rearrest due to VT/VF or PEA after ROSC is not clear.

Study Objective: To test the hypothesis that in rearrest patients, HRV metrics will be different preceding VT/VF and PEA rearrests.

Methods: Emergency medical services (EMS) patients were divided into 3 groups including those that had VT/VF (n=11), PEA (n=20), and no rearrest (n=30). For each group, ECG segments (1-2 minutes) were obtained after ROSC, from which RR intervals, then standard HRV metrics including sample entropy (a measure of predictability), mean heart rate and premature ventricular contraction (PVC) burden (percent of total beats/segment) were calculated. A Kruskal-Wallis test with a Bonferroni correction was used to compare each metric across the 3 groups and patient characteristics were compared using ANOVA and Chi-Square tests.

Results: There were no differences between groups in sex, race, ethnicity, bystander CPR, or time from arrest to initial ROSC. The no rearrest group was younger than the VF and PEA rearrest groups (median age 54 y.o. vs. 60 and 62 y.o., respectively, $p<0.05$) and primary arrest due to a shockable rhythm was observed more frequently in the VT/VF rearrest group ($p<0.01$). RR interval sample entropy was significantly ($p<0.018$) smaller (ie, more predictable) prior to VT/VF compared to no rearrest; however, it was not different prior to PEA compared to no rearrest. In contrast, standard long term HRV metrics (SDRR, SD2, Ellipse Area) were significantly increased prior to both VT/VF ($p<0.04$) and PEA rearrest ($p<0.05$) compared to no rearrest. Average heart rate and PVC burden were not different between the 3 groups. EMS administration of epinephrine was not different in the VT/VF vs. PEA groups, suggesting outcomes observed were independent of epinephrine-induced modulation of autonomic tone.

Conclusion: While long-term HRV metrics increased prior to both VT/VF and PEA rearrest, only heart rate entropy decreased (ie, RR predictability increased) prior to VT/VF rearrest. Other than primary arrest rhythm, there were no differences in demographic or resuscitation features between groups. Taken together, these data suggest that although HRV measures can predict all-cause rearrest, heart rate entropy could be used to anticipate VT/VF rearrest and thus, trigger a tailored management strategy to improve outcomes after cardiac arrest.

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200 A Quantitative Assessment of Emergency Department Boarding and its Association With Decreases in Operational Efficiency: A Multicenter Nationwide Study

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Background: Boarding of emergency department (ED) patients is associated with worse patient care and increased mortality. Our local, multicenter study demonstrated an association between increased boarding and reductions in ED intake and throughput.

Study Objectives: We investigated the relationship between boarding and ED intake and throughput using a national dataset of ED operational metrics.

Methods: Cross-sectional ED operational data were collected from the ED Department Benchmarking Alliance (EDBA), a voluntarily self-reporting operational database including 54% of EDs nationwide. Free- standing and pediatric EDs and those with missing boarding data were excluded. Key outcome variables were boarding time, door to provider time (D2P), length of stay of discharged patients (LOSD), and percent of patients leaving before treatment was complete (LBTC). Associations were investigated using multivariable regression.

Results: Operational data were available for 892 EDs. After adjusting for ED volume, trauma designation (binary yes or no), and admission rates (grouped into quartiles), increased boarding time was associated with worse D2P times, LOSD times, and LBTC rates. Across all EDs, every additional 10 minutes of boarding time (from a baseline of 0 minutes) was associated with an increase in D2P time by 0.8 minutes, LOSD time by 2.8 minutes, and LBTC rate by 0.1%. For EDs with less than 20,000 visits per year, boarding did not significantly affect operational metrics. For all other EDs, increased boarding was associated with worse ED intake and throughput metrics.

Conclusions: Using the largest available national registry of ED operational data, we found boarding significantly contributed to inefficiencies in ED intake and throughput. Boarding reduces the throughput of non-boarded patients at an approximate 4:1 ratio (boarding: LOSD). Such a large impact on ED throughput highlights the need for hospital-based solutions to boarding, as innovative ED efficiency measures have limited effect on its impact on ED operations.

No, authors do not have interests to disclose

201 Racial and Ethnic Differences in the Initiation of Low Tidal Volume Ventilation in the Emergency Department

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Objectives: Low tidal volume ventilation (LTVV) is a key component of lung protective ventilation and is defined by tidal volumes of 6-8ml/kg of ideal body weight (IBW). Initiation of LTVV in the emergency department (ED) has been shown to improve outcomes including hospital length of stay and mortality. While many studies have identified racial and ethnic disparities in various areas of health care, none have done so with respect to LTVV in the ED. This study aims to describe the variation in the application of LTVV in the ED across race and ethnicity.

Design/Methods: We conducted a retrospective cohort study of patients intubated and ventilated in three EDs across two health systems from January 2016 to June 2019. The three EDs serve urban, suburban, and rural populations, respectively. Tidal volume, race/ethnicity, hospital free days, and mortality data were collected. Patients self- identified as either White, Black, Hispanic, Asian, Pacific Islander, Native American, or mixed/other. Body mass index, height, sequential organ failure assessment (SOFA) score, and comorbidities were also extracted. Patients were compared based on whether they received an initial tidal volume of $\leq$8ml/kg IBW while in the ED. A multivariate regression analysis was performed including those characteristics associated with significantly decreased rates of LTVV. Patients $<$18 years of age and those intubated outside of the ED or missing key predictor data (eg, race, ethnicity, etc.) were excluded.

Results/Findings: A total of 1,029 patients were identified for inclusion. Patients were significantly less likely to receive LTVV in the ED if they identified as Hispanic (40.8% vs 23.0%, $p < 0.001$). African Americans, however, were significantly more likely to receive LTVV (8.1% vs 14.9%, $p = 0.009$). A multivariate regression analysis including age, female sex, non-White race, Hispanic ethnicity, and first quartile height found that Hispanic ethnicity was independently associated with inappropriately high tidal volumes (aOR 2.04, $p = 0.001$). Patients who received LTVV in the ED had 11.0 ($\pm$16.6) hospital free days compared to 8.9 ($\pm$11.4) for those who did not ($p = 0.032$). There was no significant difference in mortality.

Conclusions: In our study of three EDs, significantly lower rates of LTVV initiation and inappropriately high tidal volumes were found in those patients who identified as Hispanic. These variations in LTVV were associated with a meaningful difference in hospital free days. Further study is needed if these findings are reflective of disparities more broadly across emergency medicine.

No, authors do not have interests to disclose

202 Drug-Related Arrests Among Frequent Emergency Department Users are Compounded by Housing Status

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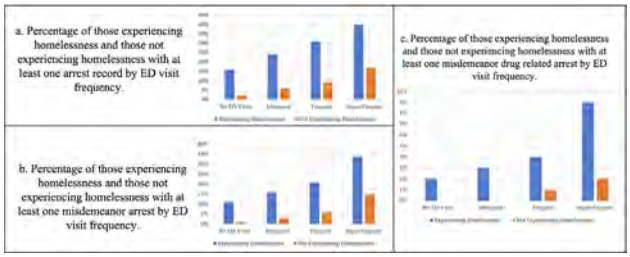
Study Objectives: Frequent emergency department (ED) users commonly experience jail incarceration. Concomitant substance use or homelessness increases the odds of arrest. However, the types of charges resulting in higher arrest rates in this group are unknown. We sought to determine if increasing ED use was associated with higher misdemeanor arrest rates, specifically those in which the most serious offense (MSO) was a misdemeanor drug offense, and the impact of housing status on this outcome. We chose substance use and housing as they are potentially modifiable from the ED through treatment and referrals.

Study Design/Methods: We conducted a retrospective study of adults in the San Francisco Department of Public Health Coordinated Care Management System (CCMS) in the 2018-2019 fiscal year (FY) which includes individuals who use county urgent or emergent medical, behavioral health, and social services. We linked CCMS records with data from the San Francisco District Attorney's (SFDA) and Sheriff's Offices consisting of all cases booked into jail and/or referred to the SFDA for prosecution. Individuals were categorized by ED visit frequency during the fiscal year: No ED Use, infrequent (1-3 ED visits), frequent (4-17 ED visits) and super-frequent ($>$18 ED visits). We performed a bivariate analysis to determine the association between frequency of ED use and misdemeanor, as well as misdemeanor drug, charges. We then analyzed the impact of housing on these associations.

Results/Findings: Our sample consisted of 46,756 individuals, of which 14,170 (30%) had no ED visits, 28,405 (61%) had infrequent, 3,874 (8.3%) had frequent and 307 (0.7%) had super-frequent ED visits. Among this sample, 9,801 (21%) experienced homelessness and 4,190 (9%) had a matching arrest in the criminal justice data. Those with higher ED visit frequency were more likely to have a history of arrest: 5% of those with no, 9% of those with infrequent, 20% of those with frequent, and 37% of those with super-frequent ED use ($p<0.01$). Of those with super-frequent ED use, 31% had been charged with at least one misdemeanor-level crime compared to 3%, 6% and 14% for those with no, infrequent, and frequent ED use respectively ($p<0.01$). We found higher rates of arrests in which the MSO is a misdemeanor drug crime among those with more frequent ED use: 8% of those with super-frequent ED use compared to 2%, 1%, and 0% of those with frequent, infrequent and no ED use ($p<0.01$). Among those with no ED visits who experienced homelessness, 2% were charged with a drug crime compared to 0% of those not experiencing homelessness ($p<0.01$); these numbers for the unhoused and housed were 3% and 0% ($p<0.01$) respectively for those with infrequent, 4% and 1% for those with frequent ($p<0.01$), and 9% and 2% for those with super-frequent ED visits ($p=0.122$) (Figure).

Conclusion: In this analysis, we found higher frequency ED use was associated with an increased likelihood of arrest and a higher likelihood of drug-related arrests. A history of homelessness was associated with higher rates of drug-related arrests. Individuals experiencing both homelessness and with higher-frequency ED use were far more likely to be arrested. Increasing substance use treatment options outside of the carceral setting and coordination with housing services in EDs, specifically focusing on frequent ED users, could impact the high rates of criminal justice involvement in this population.



No, authors do not have interests to disclose

203 Incorporation and Utilization of a Medication-Assisted Treatment Initiation 'Procedure Template'

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Introduction: In response to the worsening opioid epidemic, in April of 2021, the Department of Health and Human Resources relaxed training requirements for clinician provision of medication-assisted treatment (MAT) (buprenorphine/naloxone specifically), enabling emergency clinicians to more easily incorporate emergency department (ED)-initiated MAT into the acute management of opioid withdrawal and/or opioid use disorder (OUD). Likewise, the Centers for Medicare and Medicaid Services (CMS) added a 2021 HCPCS billing code (G2213), to encompass the cost of the initiation of MAT in the ED. We sought to demonstrate the feasibility, as well as utilization, of an 'MAT-initiation procedure template' incorporated into the electronic medical record (EMR) for ED-initiated MAT documentation and to facilitate G2213 billing capture.

Methods: In September, 2021, an ED-initiated MAT 'procedure template' was developed and incorporated, for optional and appropriate inclusion, into the existing 'Emergency Clinician' EMR note; utilized for documentation of all ED encounters, this note is also used to generate ED billing codes. The MAT procedure template was designed with auto-populated verbiage which could be easily selected (and edited) as needed; verbiage included CMS-required attestation verbiage which included 1) patient assessment, 2) initiation (medication, including duration), and 3) referral (follow-up plan). The MAT protocol template went 'live' in October, 2021. G2213 billing codes were monitored over a 6-month study period (10/1/2021 through 3/31/2022) and compared, as a percentage, of a known cohort of ED OUD patients initiated on MAT.

Results: During the study period, thirty-seven G2213 billing codes were captured via utilization of the MAT procedure template, representing 30.3% of 122 ED OUD patients initiated on MAT during this six-month time frame. This represents a

substantial increase, however, from zero G2213 billing code submissions prior to ED-initiated MAT procedure template incorporation. Of note, the G2213 billing code represents 1.89 (facility) RVU's which represents $61.25 per the 2021 national CMS payment schedule (32.4085 conversion factor); therefore, this represents $2,266.25 in potential revenue (absolute collections not obtained). If implemented for all ED OUD patients initiated on MAT, potential revenue nears $7,500.

Conclusion: The recent escalation of the opioid epidemic has resulted in EM clinicians increasingly called upon to engage and treat OUD, specifically with ED-initiated MAT. Incorporation of a MAT-initiation 'procedure template' into the emergency clinician EMR note can result in the facilitation of MAT documentation and subsequently, successful billing submissions. Opportunities exist to improve clinician utilization of this template.

No, authors do not have interests to disclose

205 Clinical Characteristics, Outcomes, and Interobserver Agreement of Point-of-Care Ultrasound Detected Mesenteric Adenitis in Non-Surgical Pediatric Abdominal Pain: A Retrospective Cohort Study

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Study Objectives: Point-of-Care Ultrasound (PoCUS) use in the emergency department (ED) may facilitate the bedside diagnosis of non-surgical sources of abdominal pain after surgical causes are excluded. Identifying mesenteric adenitis is a feasible PoCUS application due to its ease-of-use and speed. However, there is scant data regarding the diagnosis of mesenteric adenitis by PoCUS. The objective of this study was to describe the clinical characteristics, outcomes and interobserver agreement of mesenteric adenitis identified on PoCUS in pediatric patients with non-surgical abdominal pain.

Study Design/Methods: This was a retrospective review at a single, tertiary-care, urban pediatric ED. All cases of mesenteric adenitis diagnosed on PoCUS from January 2018 to April 2022 were reviewed. Demographics and clinical data, including presentation and outcomes were recorded. All PoCUS videos with clinical information were reviewed by a senior sonologist-physician for determination of mesenteric adenitis in children 21 and younger with non-surgical abdominal pain. Interobserver agreement by Cohen's Kappa was calculated between experienced and novice physician sonologists blinded to diagnosis who reviewed 77 six second video clips for presence or absence of mesenteric adenitis.

Results/Findings: Thirty subjects were identified by PoCUS to have mesenteric adenitis in the setting of non-surgical abdominal pain presenting to our ED. Most common indications for POCUS were evaluation of suspected appendicitis, suspected intussusception, or undifferentiated abdominal pain. Forty-six percent of patients were male. The median age was nine years old (IQR 4 to 14 years) for mesenteric adenitis. On 4- week clinical follow-up, no patients returned to our ED with a surgical abdomen. Cohen's kappa was 0.92 (95% CI 0.83, 1.0) between experienced physician-sonologists and 0.76 (95% CI 0.62, 0.91) between novice and experienced physician-sonologists.

Conclusion: Mesenteric adenitis, typically a diagnosis of exclusion, can be identified reliably by point-of-care ultrasound in pediatric patients with non-surgical abdominal pain, both by novice and experienced physician-sonologists. Use of PoCUS may help ED clinicians identify a common cause of non-surgical abdominal pain in children.

No, authors do not have interests to disclose

206 Children Under 12 Presenting to the Emergency Department With Covid-19

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Study Objectives: Previous pediatric systematic reviews have shown common pediatric symptoms of Covid-19 include cough, fever, sore throat, upper respiratory congestion, nausea, vomiting and diarrhea. However, these prior studies were not specific to the Omicron-dominant variant. The winter months of late 2021 and early 2022 saw a surge in pediatric patients with Covid-19. We sought to elucidate and characterize the types of symptoms and ages of patients during this wave and compare this data across age groups.

Design/Methods: Retrospective review of patients under age 12 from four community hospital emergency departments (ED). The study period included three months, December 2021 thru February 2022, covering the peak of the Omicron Covid-19 variant surge. Included are all ED patients under the age of 12 with a positive PCR or antigen test done in the ED. Excluded are patients in whom a positive antigen was incidental to the chief complaint and final diagnosis. Data includes age, sex, past medical history, chief complaints, final ED diagnoses and disposition. Age was categorized into three groups: less than one year, age 1 to age 5, and age 5 to 12. Significance testing on chief complaints was performed using Pearson's Chi-squared as appropriate. Only chief complaints with incidence of at least 5% were tested. Alpha is set at 0.008, using a Bonferroni correction.

Results: During the three study months, there was a 10-fold increase in Covid-19 patients under age 12 seen in the ED (from 0.26 patients/day to 2.44 patients per day). 25.0% of the cases were under one year old. 47.7% of the cases were female, 45.5% had only one symptom, 42.8% had two or more symptoms, and 11.7% of the patients were asymptomatic. 97.7% of the cases were discharge from the ED. The top five presenting symptoms were fever (55.5%), cough (25.5%), sore throat/URI symptoms (20.5%), nausea/emesis (14.5%), and headache (7.7%). There was one loss of smell/taste, three croup like presentations (1.4%) and four febrile seizures (2.3%). Fever was the most common isolated symptom (28.6%) and the most common associated symptom (26.8%). Children under age one had significantly more fevers ($p<0.001$) while children over five had more headaches ($p<0.001$).

Conclusions: During the Covid-19 surge of Winter 2022, there was a 10-fold increase in patients under 12 years old. Fortunately, 97.7% of patients were successfully discharge from the ED. Similar to prior studies; fever, cough, sore throat, nausea, and headaches were among the more common presentation in children. We found fever to be not only the most common isolated symptom but also the most common associated symptom in children. Fever occurred in 70.9% of children under age one. Knowing the common symptomatic presentations in children will allow Emergency Physicians to better anticipate future Covid-19 surges involving children.

Table 1: Comparison of Covid-19 by Pediatric Age Groups

	all	under 1	1-5 yo	5-12 yo	
n	220	55 (25.0%)	73 (33.2%)	92 (41.8%)	
Female	47.7%	54.5%	45.2%	45.7%	
Discharged from ED	97.7%	96.4%	97.3%	98.9%	
Symptoms					p-value
Fever	55.5%	70.9%	61.6%	41.3%	<0.001
Cough	25.5%	21.8%	30.1%	23.9%	0.511
URI symptoms	20.5%	10.9%	16.4%	29.3%	0.016
Nausea/Emesis	14.5%	12.7%	20.5%	10.9%	0.196
Headache	7.7%	0.0%	0.0%	18.5%	<0.001
Flu like symptoms	5.0%	1.8%	1.4%	9.8%	0.022
Abdominal symptoms	4.1%	0.0%	2.7%	7.6%	
Seizure	2.3%	0.0%	2.7%	3.3%	
Other respiratory symptoms	1.8%	3.6%	2.7%	0.0%	
Croup like symptoms	1.4%	0.0%	2.7%	1.1%	
Rash	1.4%	0.0%	0.0%	3.3%	

No, authors do not have interests to disclose

207 Outcomes of Patients With Septic Shock in an Emergency Department-Based Intensive Care Unit

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Study Objectives: Sepsis continues to be one of the most substantial costs to hospitals, both in terms of cost of life and significant financial burden. Septic shock,

defined by the requirement of vasopressor support, is the most severe form of sepsis with a significantly high rate of morbidity and mortality. Patients with septic shock requiring vasopressor support necessitate intensive care unit (ICU) admission. This study evaluates frequency of ICU versus general care (GC) admission and outcomes in patients with septic shock that were managed in an emergency department-based ICU (ED-ICU).

Study Design/Methods: This is a retrospective review of 369 patients in septic shock who presented to a single academic quaternary care center that required ICU level care from 2/2015 to 2/2021. All patients received initial care in the main ED and the ED-ICU. These patients were ultimately admitted to an inpatient ICU or GC floor. The primary outcome is the number of patients able to avoid an inpatient ICU admission. Secondary outcomes include the ED-ICU and hospital length of stay (LOS), fluid resuscitation between groups, the rate of ICU short stay admissions (ICU admission with transfer to GC/moderate care within 48 hours) and floor escalations of care to ICU within 24 hours. Statistical analysis was performed using the student's T-test and chi-squared test and where appropriate, $p<0.05$ was considered significant.

Results/Findings: Mean age of patients was similar, 65.5 vs 63.2, for ICU and GC admission respectively ($p>0.05$). There were similar numbers of males to females ($p>0.05$). The Charlson score for baseline comorbidities was similar between the GC and ICU patients (7.12 vs 6.63, $p=0.284$). Initial lactate for inpatient ICU admissions was higher than for GC (3.84 vs 2.79, $P=0.003$). After receiving care in an ED-ICU, 100 patients (27.1%) were able to avoid inpatient ICU admission and were admitted to GC. 269 patients (72.9%) necessitated ICU admission. ED-ICU LOS was longer for GC patients (12.49 vs 7.25 hours, $p<0.001$). Overall mortality was significantly greater for patients admitted to inpatient ICU (32.3% v 8.0%, $p<0.001$). Hospital LOS was shorter for patients admitted to GC but not statistically significant (9.05 vs 11.82 days, $p=0.141$). Fluid resuscitation was similar between patients admitted to ICU and GC (1774.2 vs 1927.7 mL, $p=0.116$). At study conclusion, 16.18% of patients de-escalated from the ICU to the floor within 48 hours after admission from ED- ICU and 1.47% de-escalated to moderate care. 5% of patients required escalation to inpatient ICU from GC within 24 hours.

Conclusion: This study demonstrates that an ED-ICU serves as an appropriate intermediary care modality for patients with septic shock requiring vasoactives. Patients receiving initial care in the ED-ICU ultimately admitted to GC have low incidence of mortality, few incidences of subsequent escalation to ICU level of care, and shorter hospital length of stay. Care between groups, Inpatient ICU and GC, appears similar as both received similar amounts of fluid resuscitation and initiation of vasopressors in the emergency department and ED-ICU.

No, authors do not have interests to disclose

208 Performance Assessment of Electronic Nose Device for Detection of COVID-19 in Breath Samples

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Study Objectives: Novel methods of rapid and large-scale testing for COVID-19 infection are necessary during the ongoing pandemic. Although common test samples are nasopharyngeal and oral specimens, breath analysis has also been proposed for COVID-19 detection. Our study objective was to evaluate the performance of the electronic nose (eNOSE), a portable breath testing device developed by the National Aeronautics and Space Administration (NASA) for the diagnosis of COVID-19 infection. The eNOSE sensor is approximately 6 inches by 3 inches by 3 inches and analyzes breath samples to detect combinations of volatile organic compounds (VOCs) diagnostic of SARS-CoV-2 virus infection.

Methods: Following Institutional Review Board and Biosafety Committee approvals, we recruited adults with a previous positive COVID-19 nasopharyngeal reverse transcription polymerase chain reaction (RT-PCR) test and volunteers with unknown infection status. During the study visit, we collected breath samples and introduced it to the eNOSE device for VOC sensing. Concurrently, participants provided anterior nares samples for RT-PCR testing for COVID-19. Cases were those who had a positive RT-PCR and the controls were those who had a negative RT-PCR at the time of breath sample collection. The sensitivity and specificity of the eNOSE device were calculated using the concurrent RT-PCR test as the gold standard.

Results: There were 64 participants enrolled, with a mean age of 42 years (SD +13 years) and of whom 44 (69%) were female. We recruited 54 previously COVID-19 positive participants and 10 participants with unknown infection status. At the time of breath collection, there were 32 RT-PCR positives, 31 RT-PCR negatives, and one untestable sample. Of those with a RT-PCR positive result, 21 had a positive eNOSE result and 11 had a negative eNOSE result. Of those with RT-PCR negative result, 21 had a negative eNOSE result and 10 had a positive eNOSE result. The eNOSE device was 66% sensitive and 68% specific for the detection of COVID- 19 infection. The mean time from recruitment to enrollment was 7 days (SD +7 days).

Conclusions: From the limited data set collected to date, the eNOSE device had moderate sensitivity and specificity for the diagnosis of COVID-19 infection. Both parameters are expected to improve as more samples are analyzed. Our next step is to include cycle threshold (Ct) values in the analysis to learn if the eNOSE response is correlated with vira

No, authors do not have interests to disclose

EMF

209 Combined Hepatitis B Virus and Hepatocellular Carcinoma Screening Using Point-of-Care Testing and Ultrasound in a Tanzanian Emergency Department: A Preliminary Report

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Study Objectives: Sub-Saharan Africa has a disproportionate burden of hepatitis B virus (HBV) and hepatocellular carcinoma (HCC). The World Health Organization aims to detect 90% of global cases of HBV by 2030 – novel screening strategies will be needed to achieve this goal. In this study, we sought to assess the utility of an emergency department (ED)-based, combined HBV and HCC screening program in Arusha, Tanzania.

Methods: We conducted a preliminary analysis of patients who participated in a combined HBV and HCC screening program at a regional referral hospital ED in Arusha, Tanzania, between April 19, 2022 and May 4, 2022. We prospectively enrolled patients who presented primarily to the ED, as well as those who were referred to the ED from clinic. All patients underwent informed consent and completed a study questionnaire. HBV testing was conducted using a rapid ($\sim$5 minutes) point-of-care (POC) immunochromatographic assay, which detects hepatitis B surface antigen. We used capillary blood samples obtained via fingerstick, for rapid assessment and minimization of risk. Patients who were HBV positive were screened for HCC via POC ultrasound (POCUS). Local ED and critical care providers with POCUS experience were trained on how to systematically screen the liver parenchyma for masses. The primary outcome was the number of new HBV diagnoses. The secondary outcome was the number of patients who had a new mass detected by POCUS that was concerning for HCC. Data were analyzed with descriptive statistics.

Results: A total of 435 patients were tested for HBV (primary ED: 355, clinic-referral: 80). The median age of patients was 45 $\pm$ 15 years, and 67% were female. Only 26% of patients reported having a primary care doctor. Fourteen percent of patients had been previously vaccinated for HBV. Sixty-six percent of patients did not know how HBV is transmitted. Six percent of patients had a family member with a known HBV infection. There were 9 new HBV diagnoses (primary ED: 8, clinic-referral: 1), which corresponds to a seroprevalence of 2.3% [95% CI 1.0, 3.9]. No patients had masses detected that were concerning for HCC. All positive patients were scheduled for follow-up visits to assess the need for HBV treatment.

Conclusion: We found that an ED-based, combined HBV and HCC screening protocol can be feasibly implemented. This pilot study could serve as a model for HBV/HCC screening in regions with high HBV endemicity and low rates of community screening.

No, authors do not have interests to disclose

210 Emergency Department Point-of-Care Echocardiography and Lung Ultrasound in Predicting COVID-19 Severity

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Study Objectives: Point-of-care ultrasound (POCUS) may reveal findings that can impact the diagnosis, monitoring, and prognosis of COVID-19 in the emergency department (ED). POCUS in cases of COVID-19 may reveal lung findings (B-lines and pleural abnormalities) as well as cardiac findings including left ventricular dysfunction (either pre-existing or from COVID induced myocarditis) or right

ventricular strain (either pre-existing or from pulmonary embolism). We sought to determine if POCUS performed on ED patients with COVID-19 can help predict disease course, severity, or identify complications.

Methods: This was a retrospective cohort study of adult patients presenting to the ED of a large academic medical center who tested positive for COVID-19 either at hospital admission or within 2 weeks prior to presentation and received POCUS of the heart and/or lungs as part of their workup. Subjects without any heart or lung diagnostic quality ultrasound clips and those with presentations not related to COVID-19 symptoms were excluded from the study. The POCUS findings of these patients (left ventricular dysfunction, right ventricular strain, presence of B-lines, and pleural line abnormalities) were analyzed, as were their hospital courses. Patients with worsening hypoxemic respiratory failure or shock requiring higher level of care as well as patients who expired were considered to have developed severe COVID-19. Multivariate logistic regression analysis was performed to determine if there was a correlation between ED POCUS findings and development of severe COVID.

Results: A total of 155 patients met study criteria, of which 148 patients had documented echo views and 120 patients had documented lung views. Our sample had mean age of 66.5 years old (+/-18.6) and was 53% female. Subjects with left ventricular dysfunction that was not previously documented had increased odds of having severe COVID during their hospitalization compared to patients with old and no left ventricular dysfunction (OR 3.98, 95% CI 1.20-13.16, p=0.024). The presence of pleural line abnormalities was also predictive for development of severe COVID during that hospitalization (OR 3.34, 95% CI 1.15- 9.66, p = 0.026).

Conclusion: Our investigation found that approximately 15% of subjects had left ventricular dysfunction not known to be present previously, and these patients were about four times more likely to develop severe COVID. Similarly, presence of pleural line abnormalities on POCUS was associated with a three-fold likelihood of severe COVID during that hospitalization. These findings suggest that POCUS can be utilized in terms of COVID-19 clinical course and prognosis.

Yes, authors have interests to disclose

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211 Traumatic Injury to the Posterior Fossa: A Secondary Analysis of Demographics, Clinical Characteristics, Computed Tomography Imaging, and Outcomes

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Study Objectives: Traumatic brain injuries to the posterior fossa are rare, not well characterized, with potential for severe events. We aim to describe characteristics and outcomes of traumatic posterior fossa injuries (TPFI).

Methods: We performed a secondary analysis of the NEXUS trauma database, including all patients whose head computed tomography identified TPFIs. We classified the injuries into three patterns: Type I – primarily above the tentorium with limited posterior fossa injury; Type II – above and within the posterior fossa; Type III – primarily within the posterior fossa, and describe epidemiology of injury with respect to demographics, clinical characteristics, mechanisms of injury, and outcomes.

Results: Of the 11770 patients in the database, 184 patients had TPFI. Among the 182 with known demographics, (Median age=56.1 years, IQR=38.6-70.1), 131 (71%) were males and 51 (28%) were females. Patients presented with a median of 4 brain injuries (IQR=2-5): there were 144 (78%) subarachnoid hemorrhage, 102 (55%) subdural hematoma, 15 (8%) epidural hematoma, 80 (43%) parenchymal bleed, 45 (25%) herniation, 26 (14%) contusion, 25 (14%) edema, and 25 (14%) pneumocephalus. Of the 170 patients with known mechanisms of injury: there were 88 (52%) motor vehicle accidents, 74 (43.5%) falls, 7(4%) assaults, and 1 (0.5%) found with trauma. Of the 184 patients with clinical evaluations, there were 42 (23%) signs of basilar/depressed skull fracture, 94 (51%) scalp hematoma, 133 (72%) abnormal level of alertness, 19 (10%) recurrent/forceful vomiting, 49 (26%) Glasgow Coma Scale of 15, 97 (53%) abnormal behavior, and 101 (55%) neurological deficit. Of the 163 patients with known outcomes, there were 52 (32%) deaths, 48 (29%) discharges home (DH), 48 (29%) discharges to rehabilitation facilities (DRF), 14 (9%) transfers to inpatient facilities (TIF), and 1 (1%) discharge against medical advice (AMA). Among 58 Type I injury patients: 19 (33%) died, 12 (21%) were DH, 20 (34%) were DRF, 6 (10%) were TIF, and 1 (2%) was AMA. Among 74 Type II injury patients: 30 (41%) died, 17 (23%) were DH, 21 (28%) were DRF, and 6 (8%) were TIF. Among 31 Type III injury patients: 3 (10%) died, 19 (61%) were DH, 7 (23%) were DRF, and 2 (6%) were TIF.

Conclusion: Brain injuries including the posterior fossa are associated with high rates of mortality and disability; only a small subset of patients can return home.

Clinical Signs/Symptoms per Injury Pattern

	Type 1 [N(%)]	Type 2 [N(%)]	Type 3 [N(%)]
	(n=63)	(n=87)	(n=34)
Signs of Basilar/Depressed Skull Fx	19 (30.1)	21 (24.1)	2 (5.9)
Scalp Hematoma	35 (55.6)	44 (50.6)	15 (44.1)
Abnormal Level Alertness	50 (79.4)	69 (79.3)	14 (41.2)
Recurrent/Forceful Vomiting	7 (11.1)	9 (10.3)	3 (8.8)
GCS 15	11 (17.5)	21 (24.1)	17 (50.0)
Abnormal Behavior	37 (58.7)	46 (52.9)	14 (41.2)
Neurological Deficit	42 (66.7)	49 (56.3)	10 (29.4)

No, authors do not have interests to disclose

212 Wait, What? Oral Midodrine Instead of Pressors for Septic Shock?

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Background: Coincident with capacity strains on our institution's intensive care units (ICUs) during the Covid-19 pandemic, we perceived an increase in the use of oral Midridone (MID) administration for blood pressure (BP) support in septic shock patients to avoid intravenous (IV)-vasoactive medications and ICU admission. Little is known about the efficacy of MID in this patient cohort. The goal of this study was to evaluate the clinical outcomes associated with use of MID to augment blood pressure support in ED patients with septic shock.

Methods: For this single center retrospective review of patients requiring pressor support after sepsis bundle activation, we assessed frequency of IV versus PO vasoactive medication administration both within the ED and after admission on patient outcomes including length of ED stay, admission level of care, discharge disposition, and mortality.

Results: Of 6293 ED sepsis bundle activations from January 1st, 2019 to April 20th, 2022, 327 (5.2%) of these patients were in shock requiring vasopressors in the ED. Of these patients, 249 received IV vasopressors (IVP), most frequently norepinephrine, but 62 received only MID while 16 patients were given both IVP and MID. The cumulative in-hospital mortality rate (MR) for administration of any of these medications in the ED was 40%. For those who received IVP only, MR was 47%; for MID only it was 14.5%; and for those who received both MR was 31.3%. EDLOS was shortest (6.92 hours) for patients receiving IVP only but increased to 11.7 hours for IVP + MID and 18.9 hours for MID. ICU admission rates were greatest (67.5%) for IVP only patients which decreased to 41.2% for MID + IVP and only 1.6% for MID. Hospital LOS was 7.81 days for IVP only, 12.75 days for MID + IVP, and 6.78 days for MID. Additionally, there were 430 patients who were initially stable in the ED but subsequently decompensated requiring initiation of vasopressive medications after hospital admission with a 40% overall MR for these patients. 210 patients were given IVP (32% MR), 118 requiring only MID (24% MR), while 102 received both (37% MR).

Conclusions: In this cohort of sepsis patients requiring blood pressure support, patients who received oral Midodrine in place of IVP had longer ED LOS, lower ICU admission rates, and lower mortality rate then patients who received IVP. However, with a less acute ESI score (average 2.1 for MID only vs 1.7 for IVP only) this cohort who composed 19% of septic shock patients presenting to the ED seemed to be considered "less sick" upon arrival. Future prospective research is required to explore the safety and efficacy of oral midodrine in the ED sepsis population requiring blood pressure support.

No, authors do not have interests to disclose

213 Development of a Quality Scorecard for Mobile Integrated Health

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Study Objectives: Mobile integrated health has expanded, and been implemented in a number of academic settings and health care companies. According to the National Association of Emergency Medical Technicians, hundreds of programs exist in at least 33 states. It has reached a critical mass, given its reach, and now requires quality measures to ensure high quality health care is offered, to allow comparison to other health care innovation models, and to disseminate best practices. The objective of this study was to develop a dashboard of quality metrics utilizing the National Academy of Medicine's six domains of health care quality.

Study Design/Methods: To construct a list of proposed measures, we conducted a review of the literature on PubMed and Google Scholar. Search terms included quality measurement and one of the following: mobile urgent care, emergency medicine, urgent care, hospital at home, mobile integrated health, community EMS and community paramedicine. Studies were included if they offered concrete quality metrics. Selected publications underwent a secondary review by the research PI. Early versions of proposed measures were reviewed independently by four academic leaders with expertise in quality improvement and/or mobile integrated health. Metrics were selected based on their feasibility, reliability, validity, interpretability, actionability, and importance. Quality metrics included broad measures (assessing whether organizations are meeting goals) and granular measures (assessing organizational errors and mistakes).

Results/Findings: Our study developed a set of quality metrics across the six domains of health care quality: safety, effectiveness, efficiency, timeliness, patient-centeredness, and equity. Provider satisfaction was included as a seventh category.

Conclusion: Our study offers a first pass at creating a set of quality metrics for mobile integrated health for both academic-based and community-based programs. A larger conversation is needed across stakeholders, including government, academic and community mobile integrated health providers, payors, and patients, to develop a standardized set of quality metrics that can be used across settings.

Domain	Core Metrics
Safety	-death rate at 30 days -adverse event rate -chart review of specific trigger events
Effectiveness	-emergency department avoidance at 7 days -hospital admission rate within 7 days -declined visit rate -repeat visit rate within 7 days -percentage of predetermined conditions for which at least 80% of objectives were reached
Efficiency	-average time on task -average visit cost compared to hospital admission, ED visit, and PCP visit -cost for patients that visit ED within 7 days
Timeliness	-wait time
Patient-centeredness	-patient Net Promoter Score (NPS) -patient satisfaction and feedback collected via small surveys throughout intervention, a post-intervention survey, and using AI analytics for qualitative data
Equity	Access: -declined visit rates by race/gender -triage categorization by race/gender Treatment: -waiting time by race/gender -analgesia offered by race/gender Outcome: -death rate by race/gender -adverse event rate by race/gender -ED avoidance rate by race/gender
Provider satisfaction	-satisfaction survey

Table 1. Mobile integrated health scorecard by domain.

No, authors do not have interests to disclose

214 Characteristics of OHCA Survival and EMS Interaction During the COVID-19 Pandemic

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Study Objective: Since the start of the COVID 19 pandemic much research has focused on the characteristics associated with increased mortality of COVID-19 patients both in the hospital and in out-of-hospital cardiac arrest (OHCA). Our analysis aimed to expand the understanding of characteristics associated with OHCA and mortality in our emergency response district and establish correspondence between out-of-hospital provider impression and treatment on the rate and survival of OHCA during the COVID 19 pandemic by comparing data abstracted from EMS charting on patients with OHCA from the March 15-May 30, 2020 as compared with the same period from 2019.

Study Design/Methods: This is a retrospective case series comparing all responses of Robert Wood Johnson Mobile Health Services to OHCA from March 15-May 30, 2019 with those March 15-May 30, 2020. After abstraction frequencies of patients are presented for demographic and medical information. Medical categories assessed include impression, medications given by EMS, past medial history, and home medications. Demographic categories include age, sex, race, and insurance status. Bivariate analyses compare each demographic or medical variable with year and then with death or not. Logistic regression is used to evaluate predictors of death among those presenting to EMS with cardiac arrest.

Results/Findings: The effect of year as a main effect was statistically significant ($p=0.018$, OR=1.84 for odds of death in 2020 vs. 2019; 95% (CI: 1.11, 3.06) and there was a significantly increased risk for death in males. An impression of known COVID-19 exposure or diagnosis at the time of OHCA was no associated with higher rate of death but a confirmed negative COVID-19 was associated with a statistically decreased risk of death. Impressions of cardiac arrest, unconsciousness, and pulmonary issues were all associated with lower rates of death. Those with cardiac arrest prior to EMS evaluation were more likely to die than those with cardiac arrest after. Many medications given by EMS were associated with death/no death as well. Of the medications taken at home, steroids and diabetes medication were significantly associated with higher rates of death. Comparing 2019 to 2020 significant increases in absolute and relative mortality were most commonly associated across categories with classification including "unspecified/unknown/other".

Conclusions: There was demonstrable excess mortality from OHCA during the COVID-19 pandemic. While much of our data characterizing OHCA during COVID-19 reflects similar findings from other global studies, our focus on first responder impressions and interventions shows increased utilization of the "unspecified/unknown/other" classifications, hypothesized to reflect the increase in at-home OHCA, as reflected in other studies globally during the early days of the pandemic and show a decrease in responder- gathered data on those deaths. Understanding and addressing the contributions to gaps in data is important to properly evaluate excess deaths. This clarifies the need for a framework for investigation of OHCA and death in the setting of pandemic or other endemic outbreak to allow adequate development of training and field protocols.

No, authors do not have interests to disclose

215 Fixed-dose vs. Weight-Based 4-Factor Prothrombin Complex Concentrate Dosing for Reversal of Warfarin-induced Intracranial Hemorrhage

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Study Objectives: Four-factor prothrombin complex (PCC) is first line treatment for rapid International Normalized Ratio (INR) reversal for major warfarin-related bleeding/emergent procedures. Nationwide, institutions have transitioned to fixed-dose PCC to save product during shortages, minimize associated costs, and improve time to administration. However, the precise dosing recommendation for warfarin reversal in intracranial hemorrhage (ICH) has not been effectively investigated. Our study aims to determine whether fixed-dose PCC 1500 IU achieves INR reversal < 1.4 and similar clinical outcomes when compared to weight-based dosing in patients with ICH (including subarachnoid and hematoma) anticoagulated on warfarin.

Study Design/Methods: Retrospective cohort study over a 6-year period at a system of 15 hospitals. Inclusion criteria: All adults ($\geq$18 years old) with ICH on initial head computed tomography, on warfarin, and treated with PCC on admission. Exclusion

criteria: pregnancy, allergic to PCC, or baseline INR < 1.4. Trained data abstractors collected data using a standardized data collection form and data dictionary. Primary outcome: INR result <1.4 between groups (number and percent of patients). Secondary outcomes: PCC dose/time to administration, length of stay, mortality, thrombotic events and repeat imaging outcomes. Statistical analysis was performed as appropriate using statistical software.

Result/Findings: During the study period there were 192 patients meeting inclusion criteria. The median age was 77 years in the weight-based dose group (WBDG) vs. 78 years in the fixed-dose group (FDG). Most patients were on warfarin for arrhythmias. The primary outcome: 89/124 (71.8%) of WBDG achieved an INR <1.4 with PCC treatment vs. 37/68 (54.4%) in FDG, p=0.04. Secondary outcomes: median PCC dose: 2200 IU in WBDG vs. 1676 IU in FDG, p<0.001. Time to PCC administration (order to needle time): 43 minutes in WBDG vs. 38 minutes in FDG, p=0.2. Length of stay (median): 5 days WBDG vs. 6 days FDG, p=0.0397). Death at encounter: 32/124 (25.8%) in WBDG vs. 17/68 (25%) in FDG, p=0.902. There were no thrombotic events in either group. Patients with repeat imaging: 57/93 (61.3%) had an improved or stable bleed outcome in the WBDG vs. 28/48 (58.3%) in FDG, while 36/93 (38.7%) in WBDG had increased bleed size vs. 20/48 (41.7% in FDG. Limitations: Single study, retrospective chart review.

Conclusions: In our retrospective single-system study, we found that more patients, treated with weight-based PCC for warfarin reversal, met an INR <1.4, but both groups had similar imaging outcomes. Our data may be useful for institutions as they implement dosing strategies for reversal of ICH in patients on warfarin.

No, authors do not have interests to disclose

216 Impact of Proposed Core Faculty Protected Time Requirements: National Survey of Emergency Medicine Faculty on Work Hours and Associated Job Satisfaction

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Study objectives: The Accreditation Council for Graduate Medical Education (ACGME) recently proposed lowering the minimum required protected time for emergency medicine (EM) core faculty to approximately 4 hours per week. Given limited information on academic EM faculty work hours and non-clinical allocation, we sought to determine and compare actual and contracted numbers of clinical and non-clinical (ie, education, administration, research) work hours. Actual time allocation was also compared to faculty's ideal allocation. We determined factors significantly associated with job satisfaction as measured by the Global Job Satisfaction scale (GJS).

Study Design/Methods: We performed a cross-sectional survey of faculty from 50 of the 249 total United States EM residency programs in the spring of 2020. A convenience, selective sampling strategy was used to optimize geographic locations, hospital type and residency setting. Information on work hours, the GJS, demographic, and EM department characteristics were collected. The survey was piloted and revised through faculty feedback. Summary statistics included percentages for categorical variables and medians with interquartile ranges (IQR) for continuous variables. Continuous variables were compared with Wilcox signed rank tests and 95% confidence intervals (95% CI). Associations with GJS were examined using stepwise backward linear regression modeling.

Results/Findings: Of 1791 surveys sent via email, 265 responses were received, yielding a response rate of 14.8%. Respondents were predominantly male (66%), married (80%), white (75.6%). Most practiced in a university setting (55%) versus community (17%) or county (18%). 77.7% identified as core faculty. The weekly median number of contracted clinical [median (IQR): 22 (16 - 22)] and non-clinical hours [12 (5- 13)] was lower than the number of actual clinical and non-clinical hours worked [difference (95% CI): 2.7 (1.5 - 4.1)] and [6.0 (3.8 - 8.8)], respectively. Respondents reported a median ideal distribution of 50% clinical work; however, the actual percentage was 62% [difference, (95% CI): 14.4% (10.8% - 17.6%)]. Core faculty reported working a median of 5 hours per week on education (IQR: 4 - 7) and a median of 2 hours per week on research (IQR: 1 - 4). Unexpectedly, a large percentage of EM faculty were unsure of the number of clinical hours specified in their contract (20%). Factors associated with increased job satisfaction included increased non-clinical time allocation, lower administrative time allocation, and core faculty status.

Conclusion: This study provides one of the first descriptions of EM faculty work hours and elucidates the association between work allocation and job satisfaction. Faculty were contracted for a greater portion of clinical and administrative hours than desired and actually work more hours in both clinical and non-clinical domains than is specified in their contracts. EM faculty reported median education-related work hours slightly above newly proposed minimums. Taken together, this suggests faculty are already performing uncompensated work and spend less time on education and research than desired. Core faculty are likely to experience decreased job satisfaction and increased burnout if non-clinical faculty hours are lowered to the proposed minimum thresholds.

No, authors do not have interests to disclose

217 The Impact of Specialized Geriatric Consultation in a Level 1 Geriatric Emergency Department on the Cost of Care

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Study Objectives: Adults older than 65 account for almost 20% of all emergency department (ED) visits, over 23.1 million in 2018, and represent a disproportionate number of potentially avoidable inpatient admissions through the ED when compared to younger patients. The purpose of this study was to evaluate the effect of Geriatric Emergency Nurse Initiative Expert (GENIE) consultation during an ED visit on the total ED and inpatient cost of care.

Methods: This was a retrospective case-control study of patients 65 years of age and older presenting to a suburban tertiary academic medical center between January 1, 2018 and March 31, 2020. The ED is a level 1 geriatric ED with an annual census of about 35,000. Patients qualified for specialized geriatric screenings if they were identified as being at risk by the Identification of Seniors at Risk (ISAR) screen and had an Emergency Severity Score of 3. Due to resource limitations, not all patients who received a GENIE order received a GENIE consult. Propensity score matching was used to mitigate potential selection bias by balancing the treatment and comparison groups on 11 demographic and clinical characteristics. Outcomes of interest were total cost of care, defined as the summed total of payment expected for all ED or inpatient encounters within 30 and 90 days of index visit. Regression models were used to assess the impact of the GENIE services on cost of care. The difference between the GENIE consult and comparison groups are reported with the 95% confidence intervals (CIs) and p-values.

Results: A total of 3835 unique patients met the inclusion and exclusion criteria, including 1269 potential treatment cases and 2566 potential controls. Propensity score matching improved the balance between cases and controls and yielded a matched dataset of 2418 unique patients consisting of 1209 cases and 1209 controls. Health care costs for inpatient and ED care were lower for GENIE consult recipients at the index visit, and both 30- and 90-days, with cost savings of $1998 USD at the index visit (95% CI $1926, $2070, p<0.001), $2344 USD within 30 days (95% CI $2247, $2441, p<0.001) and cost savings of $2004 USD within 90 days (95% CI $1895, $2114, p<0.001). A modest but statistically significant decrease in post-index cost of care for GENIE consult recipients was observed at 30 days post-index visit, with decreased costs of $338 USD (95% CI $274, $401, p<0.001). There was not a statistically significance difference in post-index cost of care for GENIE consult recipients observed at 90 days post-index visit (-$40, 95% CI -$125, $43, p=0.35).

Conclusions: GENIE Consults were associated with a decreased total cost of ED and inpatient care within 30- and 90-days of index visit. The use of specialized geriatric nurses in the ED may be an effective method of decreasing avoidable admissions for targeted older adults while reducing costs of care. The results of this study can be useful for EDs considering approaches to better serve older adults while preventing unnecessary admissions, such as those outlined in ACEPs GED accreditation pathways.

No, authors do not have interests to disclose

219 Socioeconomic and Racial/Ethnic Disparities in Out-of-Hospital Pain Management for Patients With Long Bone Fractures

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Study Objectives: Racial and ethnic minority patients are less likely to receive analgesia in the out-of-hospital setting compared to their White counterparts. It is

unknown whether these disparities persist among patients encountered by emergency medical services (EMS) with objective injuries taking socioeconomic and encounter characteristics in context. Our objective was to evaluate for socioeconomic and racial/ethnic disparities in out-of-hospital pain management among EMS-transported adults diagnosed with long bone fractures.

Methods: This retrospective cohort study used the ESO Data Collaborative 2019-2020 public use research datasets. We included adult patients transported by EMS who were subsequently diagnosed with long bone fractures at the emergency department. Primary outcomes included administration of any analgesic by EMS and pain relief (2+ point reduction on a 0-10 pain scale). Patient race and ethnicity as reported by the EMS clinician were categorized as White, non-Hispanic; Black, non-Hispanic; Hispanic; Other. The Centers for Disease Control and Prevention's Social Vulnerability Index socioeconomic theme was used to create quartiles of socioeconomic status. For patients with severe pain (>6), multivariable generalized estimating equations were used to estimate adjusted odds ratios (aOR) and 95% confidence intervals (95% CI) for out-of-hospital analgesia and pain relief by patient race/ethnicity considering clustering by EMS agency and adjusting for age, sex, type of long bone fractured, transport time, insurance, and socioeconomic status.

Results: Out of 37,801 EMS patients with long bone fractures attended by 400 agencies, 35,711 (94%) had race/ethnicity recorded. Most (81%) were White, 10% were Black, 7% were Hispanic and 1% were categorized as multi-racial or belonging to other races/ethnicities. An out-of-hospital pain score was recorded for 87% of patients. Among patients with severe pain (n=16,652), the lowest quartile of socioeconomic status was associated with reduced odds of analgesia compared to the highest quartile (aOR: 0.50, 95% CI: 0.39- 0.63). After adjustment for encounter characteristics and socioeconomic status, Black patients were less likely to receive analgesia compared to White patients (aOR: 0.71, 95% CI: 0.57-0.89). After additionally adjusting for analgesia, Black patients with severe pain were less likely to experience pain relief compared to White patients (aOR: 0.83, 95% CI: 0.71-0.97).

Conclusions: In this multi-agency study of EMS patients with confirmed long bone fractures, out-of-hospital analgesia was less frequently administered to patients with lower socioeconomic status. Regardless of socioeconomic status, Black patients with severe pain were less likely to receive out-of-hospital analgesia or experience pain relief compared to White patients. The reasons for these disparities remain to be elucidated and warrant focused quality management initiatives.

No, authors do not have interests to disclose

220 Emergent Medicine: Impact of Out-of-Hospital Red Lights and Sirens (RLS) on Time to Antibiotic Administration in Sepsis Alert Patients

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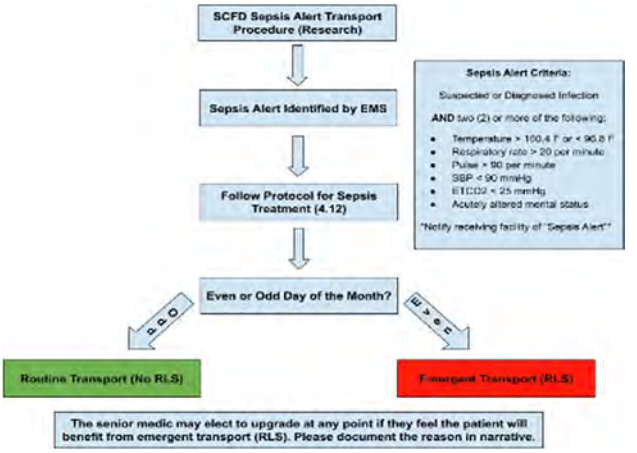
Study Objectives: This study asks whether the use of red lights and sirens while transporting patients identified as out-of-hospital 'sepsis alerts' impacts the time to antibiotic administration. Emergency Medical Services (EMS) personnel use emergent transport—characterized by the use of red lights and sirens (RLS)—for those patients deemed 'critical' or in need of potentially life-saving interventions beyond the scope of the interventions available in the out-of-hospital scenario. Nationally, the use of RLS saves ~90 seconds in urban EMS settings, which may be the difference between life and death in a cardiac arrest, traumatic hemorrhage or airway emergency. However, the decision to transport with RLS is often at the discretion of the EMS personnel without formal guidelines or evidence-based recommendations. Emergent transport is associated with increased risk of motor vehicle collision (MVC), injuries to EMS personnel and/or patients and property damage. Additionally, RLS in transport may detrimentally impact the patient's physiological and psychologic response to EMS transport. Sepsis is a life-threatening systemic response to infection, leading to shock or death if not treated with antibiotics. After receiving initial resuscitation in the field, it is common for 'sepsis alert' patients to be transported to the hospital emergently with the use of red lights and sirens (RLS). Upon arrival to the hospital, antibiotics may not be given for prolonged periods of time. Out-of-hospital antibiotic administration has shown little to no difference in patient outcomes either. These findings question the value of emergent transport of out-of-hospital sepsis alert patients, particularly when patients transported with lights and sirens have ~2.4 times higher risk of MVC.

Methods: This is a prospective, non-randomized controlled trial evaluating the clinical impact of emergent transport for patients identified as out-of-hospital sepsis alerts and transported by the Sarasota County Fire Department (SCFD) using either RLS on even days or no RLS on odd days. The time to antibiotic administration was analyzed by the priority of transport. Absolute time to antibiotic administration was calculated in minutes and analyzed using two-tailed T-tests in Excel and SPSS. Patients who tested positive for COVID-19 were removed from the data analysis.

Results: Data collection ran from May to October of 2021, with an total sample of 709 patients identified as out-of-hospital sepsis alerts. Preliminary data from June to July 2021 showed an average time to antibiotic administration of 112 minutes for emergent versus 125 minutes for non-emergent (n = 84; p-value = 0.448). The average difference in transport time between emergent and non-emergent transports was only 91 seconds.

Conclusion: There was a marked but non-significant difference in time to antibiotic administration for patients identified as out-of-hospital sepsis alerts and transported with or without RLS in our preliminary analysis. This difference cannot be explained by the time saved using emergent transport. Regional prevalence of COVID-19 cases during the study may have increased the variability in time to antibiotic administration. The absolute time of transport cannot account for the observed difference in time to antibiotic administration and hints that other variables determine the expediency of care for out-of-hospital sepsis alerts seen in the emergency department.



No, authors do not have interests to disclose

221 Impact of the COVID Pandemic on Emergency Physician Well-Being and Burnout: A 2-Year Longitudinal Study

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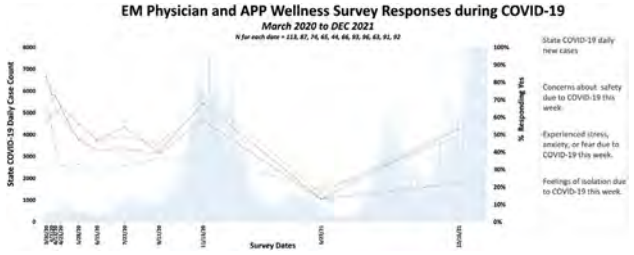
Study Objectives: The objectives of this prospective study were to assess the resilience, well-being, and burnout of emergency physicians and advanced practice providers (APPs) during the first two years of the COVID pandemic and to identify factors and associations that impact their wellness.

Study Design/Methods: From March 2020 to December 2021, emergency physicians and APPs across 3 academic and 7 community emergency departments in a single state participated in a longitudinal descriptive survey study. At 11-time intervals, participants were recruited via email to complete anonymous, voluntary surveys comprised of customized and validated tools assessing wellness (Well Being Index), burnout (Physician Work Life Balance), and resilience (Brief Resilience Scale). State health department daily COVID case counts were accessed for reference. Univariate and multivariate analysis with chi-square testing and logistic regression were performed.

Results: During the 21-month study period, there were 792 unique responses from 213 eligible participants. The mean response rate was 37% (range 21 to 53%) with 50% identifying as female. Nonrespondents were similar to respondents. Baseline resilience was normal to high. During the initial surge of the COVID pandemic in March 2020, physicians and APPs reported the highest levels of 'concerns for personal safety' (85%), 'impact on basic self-care' (66%), 'symptoms of stress, anxiety, or fear' (83%), and 'feelings of isolation' (65%), with significant improved in all categories over the first 7 months ($p<0.001$). As COVID daily case counts peaked and troughed from July 2020 to December 2021, participant responses to these categories followed similar

trends [Figure 1]. However, burnout increased over the 21-month period, ranging from 20 to 52% by December 2021 ($p<0.05$). Physicians and APPs were at significantly greater risk of burnout if they experienced an 'impact on their ability to care for children or dependents' (OR 3.32; 95% CI 2.15-5.15), 'strain on relationships' (OR 2.39; 95% CI 1.69-3.38), 'feelings of isolation' (OR 2.26: 95% CI 1.61-3.21), or 'symptoms of stress, anxiety, or fear' (OR 1.97; 95% CI 1.39-2.83). Mid-career physicians and APPs had greater odds of screening at risk on the WBI (burnout, severe fatigue, work-life integration) than their early-career peers (OR 1.27; 95% CI 1.15 - 1.4).

Conclusion: This 21-month longitudinal study adds to the literature by describing the prolonged wellness impact of the COVID pandemic on emergency physicians and APPs in the Midwest. Despite being resilient at baseline, the vast majority reported concerns for safety, stress, anxiety, fear, and isolation early in the pandemic and with subsequent surges. Mid-career physicians and APPs were identified as those most at-risk for burnout, which may be an important group to target wellness interventions. Burnout increased during the study period, implying that it is a culmination of insults over time. This data can be used to identify factors placing emergency physicians and APPs at greater risk for negative wellness outcomes and inform strategies to support our frontline team.



No, authors do not have interests to disclose

222 ED-ACT, Examining D-dimer and Empiric Anti-coagulation in COVID-19 Related Thrombosis

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Objective: Thrombosis is thought to occur frequently in the setting of acute SARS-CoV-2 infection. We aimed to elucidate the relationship between macro/micro vascular thrombosis, D-dimer levels, and empiric anticoagulation in acute COVID-19.

Methods: This was an exploratory prospective, single-site, observational study. Adult emergency department patients with COVID-19 requiring hospitalization received a point-of-care lower extremity ultrasound. Relevant clinical and demographic data were obtained by review of the electronic medical record. The primary endpoint was venous thromboembolism and associated D-dimer level. Secondary endpoints included rates of micro and macro thrombotic complications as well as empiric anticoagulant use.

Results: Between January 13th and April 12th 2021, 52 patients were enrolled. Median age was 55, 52% of patients were male. Median D-dimer at ED presentation was 650 ng/mL (range 250 to 10,000 ng/mL), among patients with negative duplex studies. One patient had a confirmed pulmonary embolism with a D-dimer of 5,082 ng/mL. During hospitalization, 18 patients underwent 20 studies assessing for VTE yielded one DVT event. Among patients with negative studies median D-dimer was 1,246 ng/mL (range 329-10,000 ng/mL). Two patients experienced microvascular complications. Seven patients were started on empiric full dose anticoagulation, with one non-severe bleeding event.

Conclusion: While VTE remains a major concern amongst patients with COVID-19, the normal D-dimer cut off of >500 ng/mL likely should not be used as a trigger to initiate further VTE workup. Additionally, mildly to moderately elevated D-dimer did not correlate strongly with microvascular complications and may not be relevant in the decision to initiate empiric full dose anticoagulation.

· Classic D-dimer cut offs are likely unreliable in acute COVID-19.
· Significantly elevated D-dimer in acute COVID-19 may be helpful in triggering a VTE workup.
· Without evidence of VTE, D-dimer alone should not be used to initiate empiric AC in COVID-19.
· Future research should focus on how best to utilize D-dimer for risk stratification in acute COVID-19.

No, authors do not have interests to disclose

223 A Multi-Modal Approach to Nerve Block Teaching

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Study Objectives: Ultrasound-guided regional anesthesia (UGRA) is quickly evolving into a pain treatment modality of choice due to its ability to provide effective analgesia without the use of opioids. While UGRA has become part of the training curriculum for most emergency medicine residents, comprehensive educational initiatives are still lacking. Our primary objective is to increase EP knowledge and confidence in performing ultrasound guided regional anesthesia (UGRA) by implementing a multi-modal nerve block teaching approach. Our approach includes a nerve block meat model workshop for both faculty and residents, posted QR codes containing procedural information, pre-assembled nerve block kits and bi-weekly nerve block posts on our educational platform. Our secondary objective is to increase the overall number of nerve blocks performed in the ED.

Methods: 11 residents participated in a nerve block workshop at a single academic teaching hospital. The workshop involved a lecture, landmark identification on models and hands-on practice on meat models which accurately simulated fascial hydrodissection under ultrasound. Knowledge and confidence were assessed on a survey pre- and immediately post-workshop. Surveys were repeated at 3 months post workshop to assess the number of nerve blocks performed in the ED.

Results: Prior to the nerve block workshop and our multi-modal approach, only 2 residents (16.7 % of the residents) had previously performed a fascia iliaca block and none of the residents had performed a serratus anterior block. Most of the residents responded "not confident at all" when asked about confidence level performing a fascia iliaca nerve block and a serratus anterior plane block. Three months after the nerve block workshop, all of the residents responded they were "moderately likely", "quite likely" or "extremely likely" to perform both of the blocks in the emergency department. Ninety percent of the residents reported feeling "moderately confident", "quite confident" or "extremely confident" performing the blocks in the emergency department. Sixty percent of the residents performed a fascia iliaca nerve block and 40% of the residents performed a serratus anterior plane block 3 months post workshop.

Conclusion: There are various barriers that exist in the adoption of UGRA by EPs in the ED. Our multi-modal approach attempts to address several different barriers at once in order to optimize the likelihood of UGRA use by EPs. We increased knowledge and confidence through a hands-on workshop that used realistic models which accurately simulated hydrodissection of fluid in a fascial plane. Frequent learning pearls emailed out to residents and attendings decreases knowledge attrition. Time to set-up for nerve blocks is decreased by the use of pre-assembled nerve block kits and QR codes posted on ultrasound machines contain quick access to procedural information. Training of both residents and attendings allows for the entire ED staff to be able to perform and supervise the same procedures. We designed our multi-modal nerve block teaching approach to allow for comprehensive education in and logistical support of UGRA for EPs which in turn increased confidence performing the nerve blocks in the ED. Our 3 month post workshop survey showed a significant increase in the total number of fascia iliaca nerve blocks and serratus anterior plane blocks performed in the ED.

No, authors do not have interests to disclose

224 Variable NIOSH Quantitative Fit Testing Failure Rates of Reused and Sterilized "Duckbill" Type N95 Masks

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Study Objectives: In response to worldwide shortages of N95 masks during the SARS-CoV2 pandemic, the Centers for Disease Control and Prevention (CDC) has highlighted various conservation and reuse strategies including isolation and vaporized hydrogen peroxide but with limitations of "safe" reuse of N95 masks up to five times. The aim of this project was to evaluate the results of NIOSH

quantitative fit testing after five trials of donning on a specific manufacturer's "duckbill" type N95 masks with/without repeated sterilization using vaporized hydrogen peroxide.

Methods: The cumulative effects of both repeated donning and doffing combined with repeated sterilization was evaluated using NIOSH Quantitative fit testing. Quantitative Fit testing generates an objective overall score across five separate tasks using an automated particle detection device to evaluate the integrity of both the mask materials and the seal on the participant. Two cohorts of duckbill type N95 masks were subjected to repeated cycles of 35% vaporized hydrogen peroxide (VHP) sterilization (five and ten cycles) and compared to one cohort of new unsterilized masks. All three cohorts were subjected to five trials of NIOSH quantitative fit testing following the protocol of donning the mask, NIOSH fit testing, then removal of the mask, with isolation for 24hrs. This cycle was repeated for five trials for each mask in each cohort. The fit testing trials were conducted on a single participant who has been fit tested and passed on this type and manufacturer's N95 mask. This repeated-measures design was chosen to remove the variability of facial size/shape for this study.

Results: Overall, a total of 150 fit testing trials were conducted, 5 trials on 30 total masks, with 10 masks in each cohort (New vs 5x sterilized vs 10x sterilized). There were a total of 21/150 (14%) fit testing trial failures, with 13/30 (43%) individual masks failing at least one fit testing trial and 4/30 (17%) masks that failed a variable number of fit testing trials spread across all five trials per mask. Chi-square analysis showed a significant increase in the percentages of masks that failed fit testing in both mask cohorts which underwent VHP compared to unsterilized/New masks (New $p=0.09$, 5x $p=0.03$, 10x $p=0.03$).

Conclusions: This data shows that this manufacturer's type and model "duckbill" N95 masks have a variable failure rate across repeated Quantitative NIOSH fit testing. There was an increased failure rate for masks that underwent sterilization. Our partner health system's mask recycling program thus discarded these type masks due to this variable failure rate. Health systems should thus consider individual testing to inform their overall policies on future mask reuse and/or recycling.

No, authors do not have interests to disclose

226 What Is the Effect of Training on the Performance of Different Video Laryngoscope Geometries Versus Direct Laryngoscopy to Achieve First Pass Success During Emergent Tracheal Intubation? A Systematic Review and Meta-Analysis

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Objective: We sought to perform a systematic review and meta-analysis of the effect of training on the performance of different video laryngoscope (VL) blade geometries to achieve first pass success (FPS) in the emergent setting in the emergency department, intensive care unit, or out-of-hospital setting.

Methods: We searched MEDLINE, Embase, and Web of Science (from database inception until April, 2022) to identify observational and randomized controlled trial (RCT) studies that compared FPS among the VL blade geometries and included data on operator level of training. We excluded studies for not comparing blade geometries, studies performed in the operating theater, simulation studies, duplicate studies, and those containing no extractable data. We used the Grading of Recommendations Assessment, Development and Evaluation (GRADE) methodology to assess the quality of included studies and used the Cochrane Risk of Bias Tool (RoB) to assess the risk of bias for the RCTs. Heterogeneity was assessed by the I2 statistic. Meta- analysis was performed using the Sidik and Jonkman random-effects model, and the results are reported as pooled odds ratios (OR) with 95% CI for FPS.

Results: We identified 1530 studies and excluded 1469; among the 61 included studies (75,583 total patients), 22 studies (36%) primarily had fellows or attendings in the intubating operators, 33 studies (54%) primarily had residents, and 6 (10%) primarily had out-of-hospital operators. Of the 61 studies, 10 (16.4%) were classified as having high quality evidence, 22 (36.1%) as moderate quality evidence, and 29 (47.5%) as low quality evidence using GRADE methodology. Among the 17 included RCTs, 8 (47.1%) were classified as having a low risk of bias using the RoB. In pairwise, random effects meta-analysis we found Macintosh-styled VL (MACVL) to be superior to DL for achieving FPS (OR = 1.66, 95% CI 1.36 -2.04, n = 27), as was hyperangulated VL (HAVL) (vs DL: OR = 1.82, 1.16 - 2.84, n = 27). MACVL and HAVL were comparable (OR = 0.94, 0.73 - 1.20, n = 4). For the studies with residents, MACVL was superior to DL (OR = 1.79, 1.40 - 2.28, n = 13). Similarly, for residents, HAVL was superior to DL (OR = 1.71, 1.21 - 2.42, n = 14). For the studies primarily with attendings, MACVL was comparable to DL (OR = 1.31, 0.96 - 1.77, n = 10); and for attendings, HAVL was also comparable to DL (OR = 2.34, 0.96 - 5.73, n = 11). For residents, HAVL was comparable to MACVL (OR = 0.94, 0.73 - 1.20, n = 4). There were no studies that directly compared HAVL to MACVL for attendings. Heterogeneity was moderate to high for all comparisons.

Conclusions: Resident physicians, but not attending physicians, intubating in the emergency department, intensive care unit, and out-of-hospital settings were more likely to achieve FPS using either a MACVL or HAVL device compared to a DL device. Although our results should be interpreted with caution, this meta- analysis suggests there is either a ceiling effect of VL devices to achieve FPS when performed by attendings or that residents may be more proficient with VL devices than attendings. Future studies should report the intubating operator's number of previous intubations to better quantify intubation experience as opposed to classifying experience based on attending or post-graduate year trainee status.

No, authors do not have interests to disclose

227 Canalith Repositioning Maneuvers (CRM) for Benign Paroxysmal Positional Vertigo (BPPV): A Synthesis of Systematic Reviews

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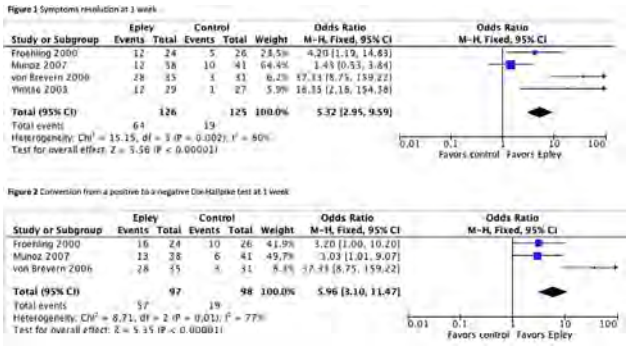
Study Objectives: Observing nystagmus during a provoking maneuver (like the Dix-Hallpike test) confirms the diagnosis of posterior canal BPPV in patients with a typical history and identifies the side and the specific canal affected. BPPV is treated effectively in most cases using Canalith Repositioning Maneuvers (CRM) like the Epley maneuver in the case of posterior canal BPPV.

Methods: This was a synthesis of systematic reviews, and we conducted a meta-analysis of individual study data. We followed guidelines for conduction of overview of systematic reviews and umbrella reviews. Patients: Adult patients diagnosed with posterior canal BPPV on Dix-Hallpike maneuver Intervention: Epley maneuver Comparison: placebo/sham procedure, or medications. Outcome: Resolution of vertigo symptoms, converting a positive to a negative Dix-Hallpike, falls and injuries, decreased side effects from unnecessary medications Harm: nausea/vomiting, inability to tolerate procedure A librarian performed the literature search after feedback from the content experts, methodologists, and patient representatives. Inclusion criteria were systematic reviews of posterior canal BPPV that performed a CRM, specifically the Epley maneuver, compared to sham maneuvers, placebo, medications, or control, as treatment for posterior canal BPPV.

Results: The literature search retrieved 2228 titles and abstracts that were screened in duplicate. Subsequently 70 titles were reviewed for full text review in duplicate, 7 systematic reviews were included in the qualitative synthesis and 1 systematic review was included in the quantitative synthesis. The outcomes of falls, injuries, and side effects from unnecessary medications were not measured or reported in any of the reviews. There was consistency observed across the 7 SRs. All reviews concluded that CRM are effective for the treatment of posterior canal BPPV. Treated patients were more likely to have resolution of symptoms at 7 and 30 days, and more likely to have negative Dix-Hallpike tests at follow up. We evaluated the effect of the intervention at 1 week and 1 month, and we found similar results with improvement of the symptoms among patients who received the Epley maneuver versus control. Specifically, resolution of symptoms at 1 week (251 patients, OR 5.32 [95% CI 2.95 to 9.59]) was in favor for performing Epley. Conversion from positive to a negative Dix-Hallpike test at 1 week (195 patients, OR 5.96 [95% CI 3.10 to 11.47]) also resulted in favor for performing Epley. There were no serious adverse effects of treatment. Rates of nausea during the repositioning maneuver varied from 16.7% to 32%.

Conclusion: There is significant improvement in symptoms among patients with BPPV that are treated at the bedside with canal repositioning maneuvers (Epley) without any serious side effects. Emergency physicians should treat their patients with Epley after clinical diagnosis of BPPV.



No, authors do not have interests to disclose

228 Variation in Lung Protective Ventilation Rates in a Rural Level One Trauma Center

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Objective: High tidal volume ventilation is associated with ventilator induced lung injury. The emergency department of our rural level 1 trauma center has the opportunity to assure initiation of lung protective ventilation (LPV) for both scene and interfacility transports. Our aim was to describe the rates of lung protective ventilation of intubated trauma patients who were admitted to the intensive care unit or operating room from our emergency department.

Methods: We performed a retrospective review of traumatically injured, mechanically ventilated adults (age ≥18) at a rural level 1 trauma center between January 2018 and March 2020. Patients were included for analysis if they were intubated and mechanically ventilated in the out-of-hospital setting, by the referring hospital, or were intubated in our emergency department. Our primary outcome was the number of patients with traumatic injuries who were ventilated with a lung protective strategy defined as a tidal volume of less than or equal to 8 mL per kilogram (mL/kg) of predicted body weight (PBW) at the time of transfer out of the ED to the intensive care unit (ICU) or operating room.

Results: Two hundred eighty-nine patients were identified; 168 (58%) of all patients received lung protective ventilation (≤8 mL/kg PBW) at the time of admission to the ICU or operating room. Of this cohort, 127 (44%) arrived from the scene and 162 (56%) were interfacility transports. 69 (54%) of scene patients received LPV and 99 (61%) of interfacility transports received LPV (p = 0.1). Of note, 74 (26%) of the cohort were women. Women received LPV at a rate of 36% compared to a rate of 66% for men (p=<0.001).

Conclusion: In a rural trauma center, lung protective ventilation rates were low in mechanically ventilated patients arriving from both the scene and interfacility transport. Female patients had a significantly lower rate of lung protective ventilation compared to males. This data reveals an opportunity for improvement in lung protective ventilation rates for trauma patients who we suspect is not unique to our institution.

No, authors do not have interests to disclose

229 Clinical Decision Support for Antibiotic Stewardship in the Emergency Department

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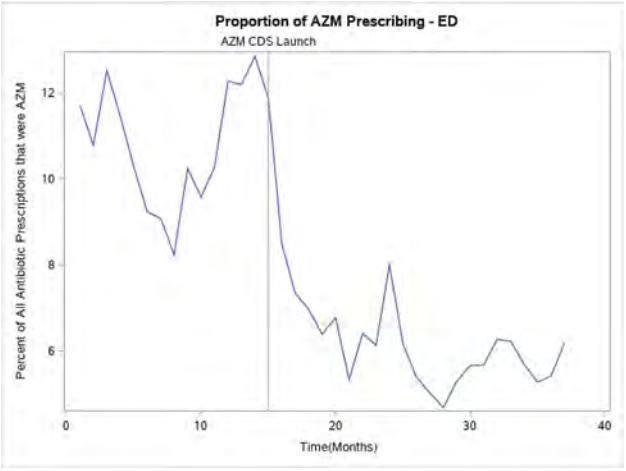
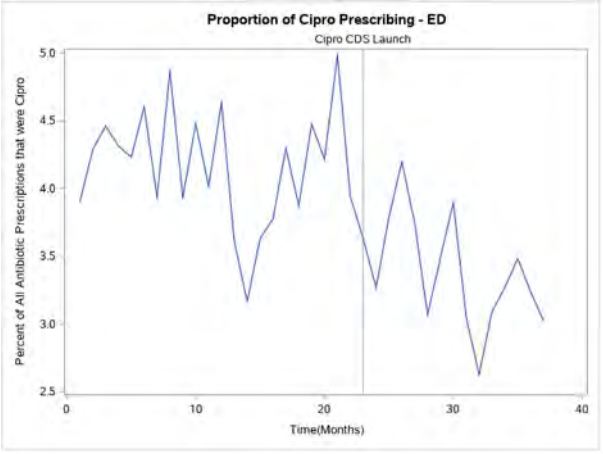
Study Objectives: Antibiotic resistance is an important patient safety issue and is among the greatest public health threats today. A behaviorally enhanced quality improvement (QI) intervention reduced inappropriate prescribing for acute respiratory infections for emergency department (ED) encounters in our health system. There is a paucity of data on clinical decision support (CDS) implementation in the ED to compliment an antibiotic stewardship program. As part of our multifaceted QI intervention, a CDS was implemented to decrease inappropriate antibiotic prescribing of fluoroquinolones (FQ) and azithromycin in the ED. The objective of our study was to decrease inappropriate antibiotics prescribing of azithromycin and FQ in the ED.

Study Design/Methods: A CDS component of a QI intervention rolled out from March to November 2020 in the ED of a tertiary level 1 trauma hospital. The CDS for azithromycin launched in March 2020 and in November 2020 for FQ (ciprofloxacin, levofloxacin, and moxifloxacin). Data for patient visits and antibiotics were obtained from the electronic health record. An interrupted time series analysis was used to study the impact of the CDS on azithromycin and FQ prescribing while adjusting for seasonality, pre-CDS prescribing trends, and temporal autocorrelation.

Results/Findings: Immediately after the implementation of the CDS, and after controlling for seasonality, the rate of azithromycin prescriptions decreased by approximately 24% (-0.27, 95% CI: -0.41, -0.14, p <0.001). The decrease in prescribing was maintained throughout the post-CDS observation period (-0.02, 95% CI: -0.03, -0.01, p <0.001). The rate of ciprofloxacin prescriptions did not statistically significantly differ from the rate pre-CDS launch (-0.09, 95% CI: -0.21, 0.03, p=0.15). However, there was a statistically significant negative trend in ciprofloxacin prescribing post CDS launch (-0.01, 95% CI: -0.03, -0.001, p=0.03), equating to an average of 1.4% fewer ciprofloxacin prescriptions written each month after the CDS went live. For levofloxacin and moxifloxacin, there was not a significant difference in prescribing rates. The most common indication for azithromycin was "acute exacerbation (moderate) of COPD" (36%), followed by "treatment of CAP (combination therapy only)" (28%). "Other" was the most common indication for the FQs. For ciprofloxacin, "Other" was chosen for 36%, followed by "acute diverticulitis or other intra-abdominal infection" (24%). For levofloxacin, "Other" was chosen in 33% of the prescribing, followed by "Complicated UTI with documented resistance to TMP-SMX, cephalosporins, or nitrofurantoin" (21%). For moxifloxacin, "Other" was chosen almost all of the time (93%) and the remaining time for "treatment of CAP with contraindication to doxycycline or beta-lactams" (7%).

Conclusion: Using CDS in the ED as part of a multifaceted antibiotic stewardship program significantly decreased the use of azithromycin and ciprofloxacin in a tertiary ED.





No, authors do not have interests to disclose

230 Learning Smarter: An Adaptive Business Curriculum for Residents That Works

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Objectives: As the health care system grows in complexity, it is increasingly critical that physicians understand core business principles related to the practice of medicine. A 2019 national needs assessment of emergency physicians demonstrated that most graduating EM residents lack exposure to important topics such as personal finance, negotiations, and billing. This abstract describes the creation, assessment, and progressive iteration of a business curriculum for EM residents to help promote expansion of similar educational efforts.

Methods: Our team developed a novel resident-focused business curriculum based on needs assessments and curriculum proposals throughout the literature, as well as an assessment strategy to evaluate its impact. The curriculum, The Business of Emergency Medicine, was developed utilizing Kern's 6-step method and is composed of 8 sessions that were first implemented from July 2020 - February 2022: personal finance, models of practice, negotiations, billing, emotional intelligence, operations, malpractice, and change leadership. Sessions were held virtually due to the pandemic and drew from expertise within our own institution as well as guest experts from across the country. We conducted IRB-approved surveys to assess learners' comfort with and knowledge of curriculum topics. Halfway through the curriculum, we added an IRB-approved structured interview component and began assessing knowledge retention 8-10 months after each session to better assess long-term effects. Ultimately, this strategy enabled us to learn more about which learning styles and topics worked best at our institution and has empowered us to improve the curriculum moving forward.

Results: Our composite, paired, pre-post session data demonstrate an improvement in comfort levels for all but one session, with half of the 8 sessions demonstrating statistically significant increases. Composite data also demonstrate knowledge gains in 7 of the 8 sessions, with half the sessions showing rises in scores by over 25% (Figure 1). Preliminary long-term knowledge retention data shows knowledge retention over time, with an increase from the pre-session average knowledge score of 61.3% correct to an average 69.9% correct 8-10 months post-session for the first five sessions. When taking a granular look at individual sessions, opportunities exist for curriculum optimization. Based on our data and interview feedback, we have learned that the nuanced nature and broader scope of the emotional intelligence and change leadership sessions show particular potential for improvement. For the second version of the curriculum, we plan to reformat the emotional intelligence session to include focused strategies for working with advanced practice providers and the broader health care team. We are also restructuring the change leadership session from a panel-based discussion to a combined lecture and hands-on site visit.

Conclusion: We successfully implemented an adaptive business curriculum that fills an educational gap in EM training and are iterating on future versions of the curriculum based on data and feedback. Future work includes continued curriculum assessment and refinement, as well as expansion across various institutions and specialties.

No, authors do not have interests to disclose

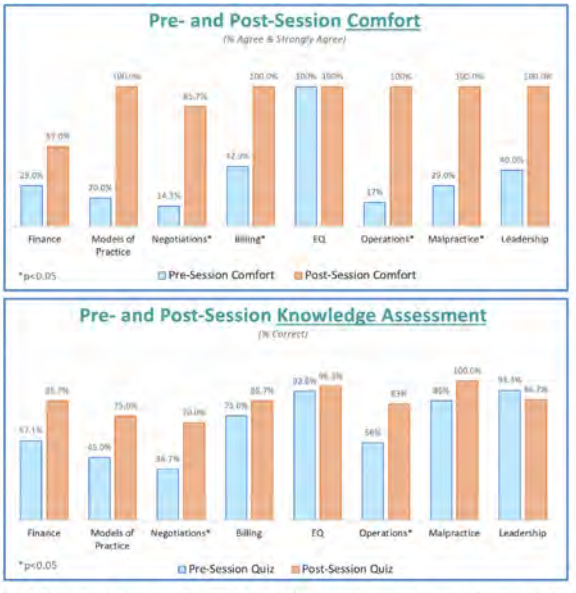

Figure 1. Paired pre- and post-session comfort level and knowledge assessment scores demonstrate an overall improvement in comfort level and knowledge scores.

231 When Time Is Short: Making the Case for Emergency Department Goals of Care Discussions Prior to Transfer

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Objective: To determine the prevalence of goals of care discussions among patients who died within 48 hours of transfer to our rural tertiary academic medical center.

Methods: We performed a retrospective chart review of all patients over 18 years old who died within 48 hours of transfer to our facility from regional emergency departments and inpatient hospitalizations between October 2011 and January 2020. Data was abstracted from both the referring hospital's documentation provided upon transfer and our own electronic medical record. Data was analyzed using STATA 10 statistical software.

Results: A total of 654 patients met inclusion criteria. The average patient age was 68 years old with 41% being female and 93% being Caucasian/white. 70.7% came from a critical access hospital. 547 (83.6%) patients had no documented goals of care discussions prior to transfer, while 107 (16.4%) had goals of care discussions. Our chart review revealed 84 (12.8%) instances of initial goals of care discussions taking place on admission to the hospital, which resulted in decisions to transition to comfort-based end of life care upon arrival.

Conclusions: Emergency physicians have a unique opportunity to help elucidate patient preferences during episodes of serious illness and to help ensure that the care delivered aligns with those preferences. We provide many time-pressured interventions that are meant to prolong patient life but which may not ultimately be in concordance with their wishes. Currently, we depend upon patients and their loved ones to have the medical savvy and assertiveness to communicate these preferences. Our findings are consistent with prior research showing that patients infrequently have goals of care discussions prior to transfer, and the 12.8% of patients who transition to comfort-based end of life care upon admission suggest room for improvement in eliciting preferences and providing goal-concordant care.

No, authors do not have interests to disclose

232 Emergency Medicine Services Handoff of Patients in Cardiac Arrest in the Emergency Department: A Retrospective Video Review Study of Duration and Frequency of Communication

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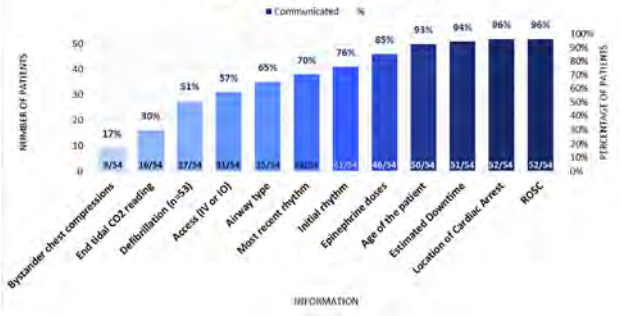
Study Objectives: The process of transferring out-of-hospital information and care of cardiac arrest (CA) patients from Emergency Medical Services (EMS) to emergency department (ED) staff is wrought with challenges. We aimed to objectively evaluate the duration and frequency of communication of vital data points between EMS and ED clinicians by leveraging our existing CA video review program. Additionally, we dichotomized the patients based on the number of data points communicated below or above the median and compared the time to first ED rhythm analysis and defibrillation between two groups.

Methods: Our tertiary care ED receives an average of 112 CAs each year, with 65% being out-of-hospital CAs transported by EMS. This is a retrospective study of handoffs between December 2020 and January 2022. All adult patients arriving in CA with audio and video recordings of the EMS handoff process available for review were included. Through an iterative process and based on prior CA video reviews, a list of the most important and commonly communicated data (location of CA, estimated down time, bystander chest compression (CPR), age, initial and most recent rhythm, return of spontaneous circulation (ROSC), defibrillation, airway type, end tidal CO2 reading (ETCO2), access, and epinephrine use) were chosen by the investigators. One investigator with extensive experience in CA video review analyzed all handoffs to determine time intervals and the duration of handoffs, EMS vs. ED initiation of handoff, as well as whether the above-mentioned data points were communicated or not. Data were described using descriptive statistics and bivariate analyses were conducted to evaluate comparisons. Our hospital's Institutional Review Board approved this study with exempt status.

Results: Overall, 54 patient handoffs were reviewed. The handoff was initiated in a median of 6 seconds (range 0-63, inter-quartile range (IQR) 1-7) after arrival. The handoff was initiated by EMS in 39 (73%) patients. The median number of data points communicated was 8. The median duration of handoff was 66 seconds (IQR 51-95). While certain data (place of arrest, estimated down time, age, ROSC, and epinephrine) were commonly communicated (>90%), others (bystander CPR and ETCO2) were communicated less than half of the time. The initial rhythm and defibrillation were reported 78% and 51% of the time (Figure 1). The median times from initiation of handoff to first ED rhythm analysis and defibrillation were 215 (IQR 155- 240) and 473 (IQR 293-1010) seconds, and it was not statistically different between patients with below vs. above median data points communicated (p>0.05).

Conclusion: In our sample, CA handoffs by EMS to ED took a median of 66 seconds, mostly initiated by ED. While ROSC, age, location of CA, and estimated down time communicated over 90% of the time, bystander CPR and ETCO2 were communicated less than 50%.

Figure 1: Proportion of Information Communicated During EMS Hand-Off (n=54)



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233 Characteristics of Leadership Communication Associated With Burnout and Teamwork Experience Among Emergency Department Staff During the COVID-19 Pandemic

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Study objectives: Management research suggests that effective communication by leaders is associated with reduced burnout and improved coordination. However, characteristics of communication that make it more useful to those who receive it are not well understood. The study objective was to examine associations between how emergency department (ED) staff experienced information communicated by leaders during the COVID-19 pandemic and their experience of burnout and teamwork.

Methods: A cross-sectional survey was administered to 635 ED staff (N = 191, response rate = 30%) working in 2 EDs affiliated with an academic emergency medicine program in California between October-December 2021. Burnout ("based on your definition of burnout, how would you rate your level of burnout?") was measured on a 5-point Likert scale. Teamwork experience was measured as the mean of 2 modified items from a validated scale asking, "during a clinical shift, when problems arose due to COVID, we addressed them as a team effort in the ED" and "we have been able to rely on all roles to jointly solve problems due to COVID in this ED." Informed by qualitative interviews reported in a previous study and measures from previously developed instruments, questions regarding the characteristics of information communication by leaders were developed. Exploratory factor analysis (EFA) was conducted using principle axis factoring with oblique rotation. Factor extraction criteria included eigen values exceeding the threshold of 1. Items were assigned to factors if they had loadings >0.4. These factors were assessed in relation to experienced burnout and teamwork using linear regression models (Table 1). Models controlled for age, sex, race, role, and primary shift worked.

Results: EFA results suggested a 3-factor solution. Factors consisted of items related to information flow (ie "information is shared too frequently"), content consistency (ie "information changes based on where I receive it from"), and accessibility (ie "information is easily accessible such that I can find what I'm looking for easily"). Regression models revealed a negative and statistically significant relationship between information accessibility and burnout (B=-0.28, p<0.01). This association remained statistically significant when controlling for the flow and content factors. Models revealed that all three factors were positively and statistically significantly associated with teamwork experience; however, this association only remained statistically significant for information accessibility (B=-0.40, p<0.01) when controlling for the other 2 factors.

Conclusion: Amid the heightened experience of burnout among health care workers during COVID-19, attention to the experience of frontline staff and their nuanced needs for information is vital. Leaders seeking to effectively communicate with staff amid uncertainty should be mindful of how staff experience information flow, content consistency, and especially, accessibility. Although leaders are often advised that there is no such thing as overcommunication, overwhelming information flow can be harmful if communication is irrelevant to fatigued staff. When disseminating information, leaders should check that communication is consistent across channels; otherwise, staff may feel that the content shared is inaccurate. Lastly, leaders should ensure that communicated information is easy to access, understand, and interpret.

Table 1. Results of linear regression models associating information communication factors with experienced burnout and teamwork

	Burnout				Teamwork			
Flow	-0.08			0.07	0.28**			0.09
Content		-0.12		-0.06		0.18**		0.03
Accessibility			-0.28**	-0.29*			0.45**	0.40**
Role								
MD	-	-	-	-	-	-	-	-
APP	0.16	0.08	0.13	0.09	-0.23	-0.08	-0.14	-0.16
RN	0.54*	0.45	0.38	0.33	-0.67**	-0.51**	-0.38*	-0.41*
Other	0.66**	0.53*	0.53*	0.46	-0.82**	-0.63**	-0.61**	-0.61**
Gender								
Male	-	-	-	-	-	-	-	-
Female	-0.21	-0.21	-0.22	-0.23	-0.17	-0.13	-0.11	-0.14
Other	0.56	0.63*	0.52	0.55*	0.53*	0.43	0.55*	0.54*
Race								
White	-	-	-	-	-	-	-	-
Black	0.18	0.17	0.32	0.33	0.23	0.20	-0.03	0.02
Asian	-0.34	-0.37*	-0.26	-0.26	0.20	0.21	0.03	0.08
Other	-0.25	-0.25	-0.27	-0.28	-0.21	-0.19	-0.16	-0.17
Shift								
Night	-	-	-	-	-	-	-	-
Day	-0.05	-0.06	-0.03	-0.03	0.01	-0.01	-0.05	-0.03
Mixed	0.21	0.17	0.24	0.22	-0.29	-0.23	-0.33*	-0.31
Age	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00
Constant	2.81**	2.92**	3.62**	3.60**	3.51**	3.81**	2.64**	2.49**

*p<0.05 **p<0.01
Abbreviations: MD=Medical doctor; APP=Advanced practice provider; RN=Registered nurse
A higher score on the burnout scale indicates increased feeling of burnout. A higher score on the teamwork scale indicated better experience of teamwork.

Yes, authors have interests to disclose
Disclosure: FujiFilm-SonoSite
Consultant/Advisor
FujiFilm-SonoSite

234 Utility of Shunt Series in the Evaluation of Ventriculoperitoneal Shunt Dysfunction in Pediatrics

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Study Objectives: Hydrocephalus is one of the most common neurosurgical issues affecting the pediatric population. Treatment typically involves placement

of a mechanical shunt to redirect cerebrospinal fluid, most commonly from the ventricle to the peritoneum. Complications associated with ventriculoperitoneal (VP) shunts include infection, malfunction of the regulator, occlusion, fractures, and displacement, among others. The clinical presentation may be non-specific, including headaches, fever, and vomiting, resulting in a large number of emergency department visits in the pediatric population due to concern for shunt malfunction. Emergency department (ED) evaluation commonly includes an x-ray shunt series to evaluate the shunt tubing for fractures or kinks and a non-contrasted computed tomography (CT) of the brain to evaluate for changes in ventricle size or signs of intracranial hypertension. The diagnostic value of the x-ray shunt series has been questioned in the adult population. Given the desire to minimize radiation, this study was designed to quantify the value of x-ray shunt series among patients with a VP shunt, which does not provide a meaningful benefit in pediatrics. This study aims to quantify the value of the x-ray shunt series among pediatric patients with a VP shunt presenting to a tertiary pediatric hospital emergency department who underwent evaluation for shunt malfunction.

Methods: We performed a retrospective review of all ED visits of patients with VP shunts who underwent both an x-ray shunt series and non-contrasted CT of the brain from 2017-2020 at Arkansas Children's Hospital. Trained research assistants reviewed each visit and recorded the results of the shunt series and CT of the brain and the presence or absence of any shunt adjustment, revision, or bedside procedure within 24 hours after the radiologic studies. Preliminary analysis was performed in Microsoft Excel to determine odds ratios and 95% confidence intervals.

Results: Our preliminary analysis reviewed 227 episodes. The median age was 1.64 years and 39.2% were male. Shunt series and CT brain were abnormal in 9.3% and 39.6% of the total population, respectively. Shunt series and CT brain alone were abnormal in 3.5% and 29.1%, respectfully. 41% of patients underwent some intervention, most commonly a shunt revision at 36.1% of the total sample. Odds Ratios for any intervention were 0.024 (95% CI 0.011-0.052) for those with normal CT brain shunt series, 28.05 (95% CI 12.17-64.70) for those with a normal shunt series and abnormal CT brain, 1.48 (95% CI 0.36-6.06) for those with an abnormal shunt series and normal CT brain, and an infinity for those with both an abnormal shunt series and abnormal CT brain. Odds Ratios of shunt revision or removal were 0.027 (95% CI 0.013-0.059) for those with normal shunt series and CT brain, 18.21 (95% CI 8.79-37.73) for those with a normal shunt series and abnormal CT brain, 1.08 (95% CI 0.251-4.63) for those with an abnormal shunt series and normal CT brain, and infinity for those with an abnormal shunt series and CT brain.

Conclusion: X-ray shunt series appears to have limited utility for identifying a need for shunt revision or intervention. Additional research is necessary to assess the benefits of foregoing x-ray shunt series among children with VP shunt presenting with symptoms which may suggest shunt malfunction.

No, authors do not have interests to disclose

235 COVID-19 Booster Vaccine Hesitancy in the Emergency Department

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Objectives: While numerous investigators have described hesitancy to receive initial doses of COVID-19 vaccines, little is known about hesitancy to receive COVID-19 booster vaccines. Booster vaccines are critically important for vulnerable populations who are not only disproportionately impacted by the pandemic, but who also often use the emergency department (ED) as their primary source of health care. We sought to describe the prevalence of and reasons for booster vaccine hesitancy in vaccinated adult ED populations.

Design/Methods: Using cluster time-block sampling techniques, we performed a cross-sectional study of adult patients at four high-volume, safety-net hospital EDs in three cities (San Francisco, CA; Seattle, WA; Durham, NC). Participants were fluent in English or Spanish and had received at least one COVID-19 vaccine. We used surveys to gather demographic data and assess attitudes toward booster vaccines. We performed a stratified analysis of non-boosted patients to quantify and understand the preeminent reasons underlying booster vaccine hesitancy.

Results/Findings: Of 246 total participants, 108 (44%) were female, 146 (59%) were non-White, 46 (19%) spoke only Spanish, and 106 (43%) were insured by Medicaid/Medicare (see Table). Of 115 (47%) who had not received a booster vaccine, 66 (57%) declined or were unsure they would accept a booster vaccine, if offered. The most common reasons for booster vaccine hesitancy were concerns about side effects, the belief that a booster was unnecessary, and a preference to wait until the passing of any present illnesses. When asked what might change booster-hesitant participants' (n=66) perspectives, the top three responses included nothing (32, 48%), more information on booster vaccines (10, 15%), and job or school requirements (6, 9%).

Conclusion: About half of participants who had received a COVID-19 vaccine had not received a booster vaccine. Over half of those who had not received a booster vaccine expressed hesitancy to do so. Educating patients about the safety and need for booster vaccines during ED visits may help overcome COVID-19 booster vaccine hesitancy in vulnerable populations.

Table. Demographic characteristics of vaccinated, non-boosted participants, stratified by booster hesitancy

Characteristic	All (112)	Will Accept Booster (49, 44%)	Booster Hesitant (63, 56%)
Age in years, median (IQR)	40 (28.5-57)	39 (28-59)	40 (30-55)
Sex			
Female	52	19 (38%)	33 (63%)
Male	60	30 (50%)	30 (50%)
Race and Ethnicity			
White	44	26 (59%)	18 (41%)
Latinx	32	7 (22%)	25 (78%)
AA/Black	20	7 (35%)	13 (65%)
Asian	2	2 (100%)	0 (0%)
Other	14	7 (50%)	7 (50%)
Primary Language			
English	83	44 (53%)	39 (47%)
Spanish	22	3 (14%)	19 (86%)
Bilingual	2	0 (0%)	2 (100%)
Other	5	2 (40%)	3 (60%)
Education			
High school or less	56	23 (41%)	33 (59%)
Some college	18	10 (56%)	8 (44%)
College degree	27	15 (56%)	12 (44%)
Graduate or professional	6	0 (0%)	6 (100%)
Prefer not to answer	3	0 (0%)	3 (100%)
Experiencing homelessness			
Yes	11	5 (45%)	6 (55%)
No	99	43 (43%)	56 (57%)
Prefer not to answer	2	1 (50%)	1 (50%)
Insurance status			
Private	28	13 (46%)	15 (54%)
Medicare/Medicaid	46	25 (54%)	21 (46%)
Other	26	7 (27%)	19 (73%)
Uninsured	12	4 (33%)	8 (67%)
Unsure	3	0 (0%)	3 (100%)

Abbreviations: IQR=interquartile range; AA=African-American

No, authors do not have interests to disclose

236 Delta National Institutes of Health Stroke Scale After Alteplase for Acute Ischemic Stroke

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Objective: To quantify the improvement or worsening of stroke severity as measured by the National Institutes of Health Stroke Scale (NIHSS) after the administration of alteplase.

Methods: This study is an Institutional Review Board approved prospective observational study of consecutive acute ischemic stroke patients presenting to the emergency department of a comprehensive stroke center from January 1, 2020 to December 31, 2021. The delta NIHSS was classified as the NIHSS at hospital discharge minus the NIHSS calculated upon initial ED presentation. Door to needle time (DTN) was calculated as the time of ED presentation to administration of alteplase. Additional variables collected included age, sex, race, whether the stroke eventually was categorized as a mimic, the occurrence of post- alteplase bleed, and whether the patient underwent thrombectomy.

Results: The cohort of 259 was 50% female. The racial composition was 43% white, 40% Hispanic, 12% black, 5% Asian, and 1% unknown. The median DTN was 37 minutes, interquartile range (IQR) 29 to 52, and a range of 14 to 187 minutes. The median initial NIHSS was 9, IQR 5-16, with a range from 0 to 40. The median post-alteplase NIHSS was 2, IQR 0-5. The NIHSS worsened in 13 (5%) patients. Seven patients (3%) had a post-tissue plasminogen activator (tPA) bleed. Ten percent (n=26) eventually coded out as a stroke mimic. Twelve percent underwent thrombectomy, and had a significantly larger and improved delta NIHSS (11 vs. 5, t-test, $P<0.0001$). Older patients also had a larger delta NIHSS ($P=0.0275$), but this was mostly in the negative direction and due to the older age of patients who suffered a post-alteplase bleed (median age 82 vs. 65 years). A multivariate model that included age, sex, race, whether a stroke mimic, and occurrence of post-alteplase bleed, or thrombectomy demonstrated that these same univariate correlates retained statistical significance. The linear regression model was robust with a goodness of fit (R2) of 14%.

Conclusion: In this cohort of acute ischemic stroke patients who received alteplase, 95% had improved NIHSS scores at hospital discharge. Patients eligible for thrombectomy had significantly higher improvement in their NIHSS scores.

No, authors do not have interests to disclose

237 Frequency of Discharge Prescriptions Known to Increase Fall Risk for Older Adults: Estimates of Incidence in the United States

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Objectives: The Centers for Disease Control and Prevention estimate that 36 million older adults fall each year in the United States, and 32,000 die due to falls. Several classes of potentially inappropriate medications commonly prescribed at ED discharge are known to elevate fall risk, including opioids (Relative Risk 1.4), benzodiazepines (Odds Ratio (OR) 1.6), sedatives/hypnotics (OR 1.5), muscle relaxants (OR 1.3), and anticholinergic agents (OR 1.6). However, little research has been done to characterize the frequency of ED prescriptions of such medications. Our objective was to estimate the annual incidence of discharge prescriptions for medications known to increase fall risk for older adults in the United States. In a hypothesis-generating exercise, we also sought to describe visit characteristics associated with prescriptions for medications that increase fall risk so that we can tailor future work to reduce potentially harmful prescriptions.

Methods: This was a descriptive, retrospective observational study of the National Hospital Ambulatory Medical Care Survey (NHAMCS) 2019 dataset. We limited our analysis to patients age 65+ who were discharged without inpatient or observation admission. We categorized patients as having received at least one ED discharge prescription for a medication known to increase fall risk (opioid, benzodiazepine, sedative/hypnotic, muscle relaxant, and/or anticholinergic agent) versus those who did not. We also generated descriptive statistics for patients in both groups. The analysis was performed with Stata/MP version 17.0, and the iweight function was used to generate national estimates.

Results: Out of a sample of 16.9 million discharged patients age 65+, an estimated 2.3 million received a prescription for at least one medication that is known to increase fall risk. The most commonly prescribed classes of medications were: opioids (1.5 million), anticholingeric agents (323,000), muscle relaxants (269,000), benzodiazepines (153,000), and sedative/hypnotics (31,000). These estimates were generated from the following unweighted results: a sample size of 2,137 patients who met inclusion criteria, and 291 who received medications known to increase fall risk (176 opioid, 52 anticholinergic, 45 muscle relaxant, 14 benzodiazepine, and 4 sedative/hypnotic). Given the small sample size for the less common prescriptions, comparisons in the Table are done using pooled data for all patients with prescriptions of interest.

Conclusions: Approximately 2.3 million older adults received prescriptions at the time of ED discharge for medications that are known to increase fall risk. The role that these prescriptions play in causing falls and other adverse health outcomes after ED discharge has not been thoroughly investigated.

Patient/Visit Characteristic		Fall Risk Medication (n=291, national estimate = 2.3 million)	No Fall Risk Medication (n=1,846, national estimate 14.6 million)
Age	65 to 74	1.4m (61.9%)	7.3m (52.4%)
	75 to 84	459k (20.8%)	3.8m (27.3%)
	85+	323k (17.3%)	2.8m (20.3%)
Sex	Male	738k (31.6%)	5.98m (41.0%)
	Female	1.59m (68.4%)	8.62m (59.0%)
Day of Week	Weekday	1.79m (76.6%)	10.7m (73.4%)
	Weekend	545k (23.4%)	3.88m (26.6%)
Race	Black	405k (17.3%)	2.48m (17.0%)
	White	1.88m (80.4%)	11.6m (79.8%)
	Other/Unknown	52k (2.2%)	475k (3.3%)
Ethnicity	Non-Latinx	2.1m (90.4%)	13.3m (91.4%)
	Latinx	225k (9.6%)	1.26m (8.6%)
Primary Payer	Medicare	1.8m (77.6%)	11.4m (78.3%)
	Medicaid	119k (5.1%)	662k (4.5%)
	Private	170k (7.3%)	917k (6.3%)
	Other	243k (10%)	1.6m (10.9%)
Visit for Injury?	Yes	4.6m (31.5%)	995k (42.7%)
	No/Unknown	10m (68.5%)	1.33m (57.3%)
Known Alzheimer's Diagnosis	Yes	116k (5.0%)	741k (5.1%)
	No	2.22m (95.0%)	13.9m (94.9%)
Region	Northeast	295k (12.7%)	2.75m (18.8%)
	Midwest	394k (16.9%)	2.89m (19.8%)
	South	1.14m (48.7%)	6.24m (48.7%)
	West	507k (21.8%)	2.7m (18.6%)
Metropolitan Statistical Area?	Yes	1.81m (77.9%)	11.5m (78.6%)
	No	515k (22.1%)	3.12m (21.4%)

No, authors do not have interests to disclose

238 A Comparison of Sengstaken-Blakemore Tube Insertion Performance Between Academic Emergency Medicine Attending and Resident Physicians

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Study Objectives: Sengstaken-Blakemore (SB) tube insertion is a rare but potentially life-saving skill used to manage emergent upper gastrointestinal bleeding. Although SB tube insertion is part of the emergency medicine (EM) curriculum, no widespread, objective standard exists to ensure competency. Moreover, practicing physicians have infrequent opportunities for application in the clinical environment. Therefore, variable skills in placing an SB tube may be observed. Our primary objective was to compare SB tube insertion performance between academic EM attending and resident physicians. Our secondary objective was to determine if a simulation-based mastery learning (SBML) intervention improved performance.

Study Design/Methods: This is a retrospective pilot cohort study of data collected prospectively as part of a quality improvement initiative in the emergency department at a large, academic, tertiary care hospital between February and April 2022. Participants included volunteer EM attending and resident physicians. All participants were asked to perform SB tube insertion in a simulation setting before the intervention. Their performance was assessed using a 30-step checklist to insert the SB tube correctly. Participants were expected to meet a predetermined minimum passing score (MPS), set using the Mastery Angoff technique. Those who met the MPS on pretest were exempt from the educational intervention. A posttest was obtained after an in-person demonstration of proper SB tube insertion and an opportunity for deliberate practice. The primary outcome was a comparison of EM attending and resident physician baseline performance. The secondary outcome was the difference in test scores before and after an SBML intervention.

Results/Findings: A total of 25 subjects participated, including 16/100 (16.0%) attending and 9/60 (15.0%) resident physicians. We excluded three attending physicians from the analysis because they did not wish to have a baseline assessment. Only one attending physician and no resident physicians achieved the MPS on the initial assessment. There was no significant difference in the median baseline score between attending and resident physicians (46.7% vs. 26.7%, $p = 0.096$). Insertion performance was highly variable for attending physicians (16.7% to 96.7%). The median score for all participants improved following our SBML intervention (30.0% to 100%, $p<0.001$).

Conclusion: In a small sample of EM attending and resident physicians, SB tube insertion performance among both groups was suboptimal and not significantly different between groups. Attending physicians had highly variable insertion

performance, and SBML improved the performance of all participants. Our results require validation in a larger cohort.

No, authors do not have interests to disclose

239 Project PANDA: An Individual and Systems Based Approach to De-Escalation

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Study Objectives: The safety of staff and patients are at risk during the de-escalation of acutely agitated patients. A strategy to address de-escalation events is the implementation of multidisciplinary de-escalation teams. This project aims to use a multi-tier simulation approach to improve resident comfort and address systems level issues that may be encountered during acute de-escalation.

Study Methods: After a needs assessment was performed, an agitated patient simulation encounter was created. This encounter involves the use of a de-escalation team to perform verbal and medical methods of de- escalation. This encounter was used in two initiatives. One was the creation of an educational module consisting of the simulation and a lecture, which would be taught to junior residents. The other was the use of the simulation as a series of in-situ encounters in the adult emergency department to identify Latent Safety Threats and act as part of a Plan-Do-Study-Act Cycle to improve de-escalation encounters.

Results/Findings: 1. Thirteen residents underwent the module. Comfort levels on agitated patient encounters were measured pre and post on a Likert Scale. Pre-intervention the mean comfort level with de-escalation was 2.4, post- intervention 3.8. 2. Five in-situ simulations were run as part of PDSA one in the Adult ED, which involved the activation of multidisciplinary de-escalation teams. Several latent safety threats were identified, spanning teamwork, communication, and equipment issues.

Conclusion: This project demonstrates how simulation as a modality can be used simultaneously as an educational and quality improvement tool in the de-escalation of acutely agitated patients.

No, authors do not have interests to disclose

240 Emergency Department Patients Who Leave Prior to Being Seen: Demographics and Predisposing Factors

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Study Objectives: There are occurrences in which patients who present to the emergency department (ED) leave prior to being seen (LPBS) by a physician. This includes patients who arrive at the emergency department who leave before or after being triaged. These patients may not have the means to continue their care on an outpatient basis, and their decision to leave might be driven by socioeconomic reasons, or issues with perceived or actual length of stay (LOS) in the ED. Understanding what drives this behavior and predisposing socioeconomic factors could lead to the establishment of safeguards that lower its incidence. Our objective in this study is to determine demographic characteristics that are associated with LPBS.

Study Design: Hospital records of patients who visited 13 distinct HCA Healthcare owned hospital emergency departments in the North Florida division from January 1st 2019 to December 31st 2019 were screened utilizing the HCA Enterprise Data Warehouse. Institutional Review Board approval was obtained to conduct this study. Patient demographics and disease characteristics were noted, and groups of patients who had LPBS were compared to a control group by utilizing statistical analysis.

Results: A total of 34,139 records of patients who registered in the emergency departments for evaluation were screened in this study. Of these, 1002 patients had LPBS (2.94%). For this group of patients, the age range was 18 to 90 years old with a mean age of 40.3 years old. 610 (60.88%) of these patients were female and 392 (39.12%) were male. Age was found to have a statistically significant association with LPBS ($P<0.05$), with an odds ratio (OR) of 1.008 (1.003-1.013) with increasing age. The racial categorical distribution of the LPBS patients were 585 in the "White", 312 in the "Black", and 105 in the "Other" categories. Racial category was found to have a statistically significant association with LPBS ($P<0.05$), specifically with the "Other" category having an OR estimate of 0.750 (0.575-0.979) of LPBS when compared to the "White" category. The "Black" category compared to "White" category OR was 1.150 (0.961-1.375). Insurance status was also found to have a statistically significant association with LPBS ($P<0.0001$) with patients having insurance having an OR estimate of 0.685 (0.579-0.809) of LPBS when compared to patients without insurance. LOS in the ED also had a statistically significant association with LPBS ($P<0.0001$) with an OR of 0.992 (0.991- 0.994).

Conclusion: Patients leaving the emergency department prior to being seen is a phenomenon with many possible geographical and socioeconomic driving factors. Time efficiency of the health care systems in the setting of an emergency department may also influence this decision. However, we found that increasing length of stay did not have a positive relationship with LPBS. The decision to LPBS could be driven by the perceived LOS instead of the actual LOS . We also need to address racial discrepancies in the delivery of health care, for which more research in this area is needed. Patients without insurance may feel discouraged from completing their ED evaluation due to financial reasons. More research is needed in individual ED settings to address discrepancies and encourage patients to complete their evaluation by a physician.

No, authors do not have interests to disclose

241 Multicenter Prospective Evaluation of Out-of-Hospital Cardiac Arrest Patients Using Transesophageal Echocardiography: A Preliminary Analysis from The Resuscitative TEE Collaborative Registry

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Study Objectives: Transesophageal echocardiography (TEE) has been proposed as a tool that is ideally suited to image patients during cardiac arrest resuscitation. Providing continuous imaging of the heart during cardiopulmonary resuscitation (CPR), TEE can help identify reversible pathologies and optimize the quality of chest compressions. We performed a preliminary analysis of data collected by the Resuscitative TEE Collaborative Registry, a multicenter, prospective, observational study evaluating the use of TEE during out-of-hospital cardiac arrest (OHCA).

Study Design/Methods: Prospective, multicenter cohort study involving patients with OHCA in whom TEE was performed during intra or post arrest phases of resuscitation. Primary outcome was prevalence of diagnostic findings, and secondary outcomes included position of the area of maximal compression (AMC), and resuscitation outcomes, including return of spontaneous circulation (ROSC), survival to hospital admission, and survival to hospital discharge.

Results/Findings: One hundred and thirty seven patients were included in the analysis, from which 74 (54%) were evaluated intra-arrest, 53 (39%) were evaluated post-arrest, and 10 (12%) were evaluated both intra- and post-arrest. The prevalence of diagnostic findings was 21% pseudo-PEA, 14% RV dilation, 11% intracardiac thrombus, 12% fine ventricular fibrillation, and 2% cardiac tamponade. Overall, TEE was considered to have provided a likely etiology for the arrest leading to a change in management in 22 (28%) cases. Initial AMC during CPR was determined in 59/84 (70%) patients, with 36 (43%) located in LV, 19 (23%) located in LVOT or aortic root, 4 (5%) in other locations. Among patients evaluated intra-arrest who experienced ROSC, the initial AMC was determined over the LV in 17 (20%) patients, as compared to 3 (4%) in which the AMC was determined over the LVOT or aortic root ($p=0.04$). There was no significant difference in the location of the AMC between patients who received manual vs mechanical CPR. In this cohort of OHCA patients, 71 (52 %) patients achieved ROSC; 37 of these patients survived to ICU admission (27 %), and 16 (12 %) survived to hospital discharge. Of the patients who survived to hospital discharge, 12 (75 %) were discharged to home, 3 (19 %) to a nursing facility, and 1 (6%) to a rehabilitation center.

Conclusion: In this preliminary analysis of OHCA patients, TEE was found to provide diagnostic information and lead to a change in management during resuscitation. Consistent with previous single center studies, this multicenter cohort confirms the finding that the initial AMC is located over the LV in less than half of patients evaluated with TEE intra-arrest.

Yes, authors have interests to disclose

Disclosure: Fujifilm Sonosite

Consultant/Advisor

Fujifilm Sonosite

Disclosure: Course Director - The Resuscitative TEE Workshop

Other

Course Director

The Resuscitative TEE Workshop

242 Computed Tomography Imaging of Geriatric Patients With Uncertain Head Trauma

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Study Objectives: While clinical decision rules (CDR) exist for patients who sustain head injuries, there are no tools to use for patients unaware of a potential head trauma event. This is common in patients older than 65 years of age who may have no memory of an injury due to dementia or loss of consciousness. Lack of a CDR for patients with possible, but uncertain trauma may lead to increased and perhaps unnecessary head CT imaging. This study examines geriatric patients who present to the emergency department (ED) with uncertainty of head trauma occurrence. We evaluate the rates of acute intracranial hemorrhage (ICH) and mortality in patients with uncertain head trauma and evaluate ICH risk factors.

Study Methods: This is a prospective cohort study of patients presenting to the EDs of two level-one, university affiliated trauma centers from August 2019 to August 2020. All patients over the age of 65 years who had a head CT due to definite or uncertain head injury were included and followed for 90 days. Risk factors assessed included age >80 years, sex, alcohol use, tobacco use, history of dementia, anticoagulant use, antiplatelet use, and Glasgow Coma Scale (GCS) <15. Primary outcome was acute traumatic ICH diagnosed on initial ED head CT. Secondary outcomes included delayed ICH diagnosed after an initial negative CT, need for neurosurgical intervention, in-hospital mortality, and 90-day mortality. Mortality was determined if the patient had died during the hospitalization or was listed in the state death registry. Odds ratios were calculated between patients with definite versus uncertain head trauma groups.

Results: 3855 patients were enrolled, 2905 with definite head trauma and 950 with uncertain head trauma. Background characteristics were similar between groups. Acute ICH rate was 10.7% for those with definite head trauma and 1.5% for those with uncertain trauma (OR 8.02, CI 4.67-13.76). Delayed ICH rate was 0.7% for those with definite head trauma and 0.1% for those with uncertain trauma (OR 6.58, CI 4.67-13.76). Neurosurgical intervention rate was 1.2% for those with definite head trauma and 0.3% for those with uncertain trauma (OR 3.74, CI 1.15-12.20). There was no significant difference in mortality. Patients with definite head trauma had higher rates of ICH with male sex (OR 1.58, CI 1.24-1.99), alcohol use (OR 1.62, CI 1.25-2.09), antiplatelet use (OR 1.84, CI 1.46-2.31), combined anticoagulant and antiplatelet use (OR 2.40, CI 1.66-3.47), and GCS <15 (OR 3.24, CI 2.54-4.13). Patients with uncertain trauma did not have any specific characteristics associated with an increased ICH rate.

Conclusion: While ICH rate in patients with uncertain head trauma was eight times less than those with definite head trauma, a 1.7% risk of ICH is still high enough to warrant CT imaging of all patients greater than 65 years old with uncertain or definite head injury. No specific characteristics were identified to better predict ICH in patients with uncertain head trauma.

Table. Outcomes of patients with definite versus uncertain head trauma.

	Definite N=2905	Uncertain N=950	OR (95% CI)	p-value
Acute ICH	311 (10.7%)	14 (1.5%)	8.02 (4.67-13.76)	<0.001
Delayed ICH	20 (0.7%)	1 (0.1%)	6.58 (0.88-49.09)	0.034
Neurosurgical intervention	34 (1.2%)	3 (0.3%)	3.74 (1.15-12.20)	0.019
In-hospital mortality	20 (0.7%)	12 (1.3%)	0.54 (0.26-1.11)	0.090
Death <90 days	345 (11.9%)	130 (13.7%)	0.85 (0.69-1.06)	0.141

Yes, authors have interests to disclose

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Grant Support

Florida Medical Malpractice Joint Underwriting Association

244 Utility of Abdominal Computed Tomography in Geriatric Patients With Ground-Level Fall

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Study Objectives. The number of elderly patients aged 65 and older presenting to the emergency department (ED) after a ground-level fall (GLF) is increasing as the population ages. The utilization of non- selective computed tomography (CT) "pan-scans" of the head, neck, chest, and abdomen/pelvis is an increasingly common clinical practice. However, indiscriminate use of pan-scans has negative consequences, including increased cost, reduced efficiency, and increased incidental findings that are clinically insignificant. More specifically, the utility of abdominal imaging after a GLF is questionable. The purpose of this ongoing study is to describe the presentation, abdominal injury patterns, and outcomes of elderly patients presenting after a GLF who received a pan-scan.

Methods: Structured chart reviews were completed on a convenience sample of patients aged 65 or older who presented to an academic, tertiary-care, level 1 trauma center for GLF between November and December 2021 and received a pan-scan. Data recorded included clinical and demographic characteristics at ED presentation, injuries identified on abdominal CT, and the impact of identified abdominal injuries on management and outcomes.

Results: Of 145 patients analyzed to date, the mean age was 81 ± 9 years, 80 (55.2%) were females, and 79 (54.5%) were on at least 1 antithrombotic (antiplatelet/anticoagulant) agent. Regarding imaging, 74 patients (51.0%) had at least one incidental (non-traumatic) finding on their pan-scan CTs, and 3 patients (2.1%) had a traumatic abdominal injury (Table 1). None of these 3 patients (0%) died or required a procedure due to their abdominal injuries during their admission.

Conclusion: In our study sample, traumatic intra-abdominal injuries were rare among elderly patients who present with GLFs, but incidental findings were common. Our results suggest that the indiscriminate use of abdominal imaging in elderly patients presenting with GLF may have limited utility.

Table 1. Patients with Abdominal Injuries and Interventions

Patient	Age	Sex	Injuries	PE Findings	Antithrombotics	BP[1]	HR[1]	RR[1]	GCS[1]	Interventions
1	69	Female	Grade 3 splenic laceration Kidney contusion	Non-tender Non-tender	Aspirin	180/90	95	16	14	Serial abdominal exams, repeat CBC Supportive care
2	91	Male	Occult bowel injury	Non-tender	Aspirin	134/84	65	20	14	Serial abdominal exams
3	68	Male	Pelvic hematoma	Tender	None	136/85	105	30	15	Repeat CBC

BP: Blood pressure; CBC: Complete blood count; GCS: Glasgow Coma Score; HR: Heart rate; PE: Physical Exam; RR: Respiratory rate
1: Initial vital signs and Glasgow Coma Scores

No, authors do not have interests to disclose

245 Association Between Intra-Arrest Blood Glucose Level and Outcomes of Resuscitation at the Emergency Department: A Retrospective Study

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Background/Objectives: Since current cardiac arrest guidelines do not address the benefit of blood glucose measurement, the ideal ranges and target of blood glucose (BG) levels during cardiac arrest to achieve a better result are warranted. We intended to investigate the associations between intra-arrest BG levels and outcomes of cardiac arrest resuscitation at the emergency department (ED).

Methods: We conducted a retrospective observational study at a single university hospital. Cardiac arrest patients at the ED between 2017 and 2020 were included. Multivariable logistic regression analysis was analyzed to examine the associations between intra-arrest BG levels and clinical outcomes. We categorized intra-arrest BG into five groups: <70 mg/dL, 70-119 mg/dL, 120-250 mg/dL, 251-350 mg/dL, and >350 mg/dL.

Results: A total of eight hundred and nineteen patients experienced ED cardiac arrest during the study period. Of all, 385 who had intra-arrest BG measurements were included in the data analysis. The mean age was 60.4 years. The mean intra-arrest BG level was 171.1 mg/dL, with 64 (16.6%) patients had intra-arrest BG level below 70 mg/dL and 28 (7.3%) patients had intra-arrest BG level more than 350 mg/dL. Markedly low intra-arrest BG level (<70 mg/dL) was significantly associated with a lower chance of return of spontaneous circulation (ROSC, OR 0.31, 95% CI 0.13-0.71, p=0.006). Also, a markedly high intra-arrest BG level (>350 mg/dL) was significantly associated with a lower chance of ROSC (OR 0.21, 95% CI 0.06-0.69, p=0.01).

Conclusion: For patients who experienced cardiac arrest at the ED, extremely low and high intra-arrest BG levels were inversely correlated with sustained ROSC and survival to hospital admission. Although we could not draw a causal relationship between variables concerning this study design, normalizing intra-arrest BG showed to have resulted in good clinical outcomes.

Table 1. Baseline demographics, clinical characteristics, features, and interventions of study population.

Variables	All patients (n=385)	Intra-arrest BG <70 mg/dL (n=64)	Intra-arrest BG 70-119 mg/dL (n=71)	Intra-arrest BG 120-250 mg/dL (n=177)	Intra-arrest BG 251-350 mg/dL (n=45)	Intra-arrest BG >350 mg/dL (n=28)	P-value
Age, year (SD)	60.4 (20.7)	61.5 (20.7)	57.9 (22.0)	62.2 (21.5)	58.1 (18.0)	55.8 (15.9)	0.34
Male, n (%)	236 (61.3)	32 (50.0)	47 (66.2)	112 (63.3)	29 (64.4)	16 (57.1)	0.31
Time of arrival at ED, n (%)							0.30
8.01-16.00	139 (36.1)	29 (45.3)	26 (36.6)	60 (33.9)	16 (35.6)	8 (28.6)	
16.01-24.00	126 (32.7)	15 (23.4)	23 (32.4)	66 (37.3)	10 (22.2)	12 (42.9)	
24.00-8.00	120 (31.2)	20 (31.3)	22 (30.1)	51 (28.8)	19 (42.2)	8 (28.6)	
Traumatic mechanism, n (%)	71 (18.4)	8 (12.5)	15 (21.1)	34 (19.2)	10 (22.2)	4 (14.3)	0.62
Initial shockable rhythm, n (%)	58 (15.1)	6 (9.4)	13 (18.3)	27 (15.3)	7 (15.6)	5 (17.9)	0.63
Adrenaline given during cardiac arrest, n (%)	378 (98.2)	61 (95.3)	71 (100.0)	174 (98.3)	45 (100.0)	27 (96.4)	0.20
Amiodarone given during cardiac arrest, n (%)	46 (12.0)	1 (1.6)	8 (11.3)	25 (14.1)	10 (22.2)	2 (7.1)	0.006
Lidocaine given during cardiac arrest, n (%)	27 (7.0)	0 (0)	3 (4.2)	18 (10.2)	4 (8.9)	2 (7.1)	0.03
Dextrose given during cardiac arrest, n (%)	69 (17.9)	51 (79.7)	8 (11.3)	8 (4.5)	1 (2.2)	1 (3.6)	<0.001
CPR duration, min (SD)	21.3 (14.2)	23.9 (18.2)	23.3 (13.5)	19.7 (13.3)	19.6 (11.8)	23.1 (14.7)	0.14
Intra-arrest blood glucose level, mg/dL (SD)	171.1 (111.4)	41.0 (17.9)	97.8 (13.7)	172.7 (36.1)	293.3 (31.6)	448.1 (80.6)	0.001

Abbreviations: BG, blood glucose; CPR, cardiopulmonary resuscitation; ED, emergency department; SD, standard deviation

Table 2. Clinical outcomes of study population.

Outcomes	All patients (n=385)	Intra-arrest BG <70 mg/dL (n=64)	Intra-arrest BG 70-119 mg/dL (n=71)	Intra-arrest BG 120-250 mg/dL (n=177)	Intra-arrest BG 251-350 mg/dL (n=45)	Intra-arrest BG >350 mg/dL (n=28)	P-value
Sustained ROSC, n (%)	188 (48.8)	20 (31.3)	28 (39.4)	103 (58.2)	28 (62.2)	9 (32.1)	<0.001
Survival to hospital admission, n (%)	120 (31.3)	11 (17.2)	20 (28.2)	67 (38.1)	18 (40.0)	4 (14.3)	0.003
Survival to hospital discharge, n (%)	43 (11.4)	3 (4.8)	11 (15.5)	20 (11.7)	7 (15.9)	2 (7.1)	0.24
Favorable neurological outcome at discharge, n (%)	13 (3.5)	1 (1.6)	3 (4.4)	4 (2.4)	3 (7.0)	2 (7.4)	0.27

Abbreviations: BG, blood glucose; ROSC, return of spontaneous circulation

Table 3. Multiple logistic regression model with each outcome as the dependent variable stratified by intra-arrest blood glucose

Outcomes*	Odds ratios	95% confidence intervals	P-value
Sustained return of spontaneous circulation			
<70 mg/dL	0.31	0.13-0.71	0.006
70-119 mg/dL	0.57	0.26-1.28	0.17
120-250 mg/dL	1	Reference	-
251-350 mg/dL	1.45	0.58-3.67	0.43
>350 mg/dL	0.21	0.06-0.69	0.01
Survival to hospital admission			
<70 mg/dL	0.33	0.12-0.86	0.02
70-119 mg/dL	1.01	0.44-2.33	0.97
120-250 mg/dL	1	Reference	-
251-350 mg/dL	1.30	0.54-3.16	0.56
>350 mg/dL	0.16	0.04-0.66	0.01
Survival to hospital discharge			
<70 mg/dL	0.34	0.08-1.54	0.16
70-119 mg/dL	1.92	0.74-5.03	0.18
120-250 mg/dL	1	Reference	-
251-350 mg/dL	1.65	0.56-4.88	0.37
>350 mg/dL	0.35	0.06-2.13	0.25
Favorable neurological outcome at discharge			
<70 mg/dL	0.34	0.02-6.93	0.49
70-119 mg/dL	5.27	0.69-40.12	0.11
120-250 mg/dL	1	Reference	-
251-350 mg/dL	5.50	0.66-46.09	0.12
>350 mg/dL	2.64	0.19-36.10	0.47

*Adjusted for sex, age, time of arrival, mechanism of cardiac arrest, initial shockable rhythm, adrenaline administration, amiodarone administration, lidocaine administration, and cardiopulmonary resuscitation duration

Figure 1. Study flow

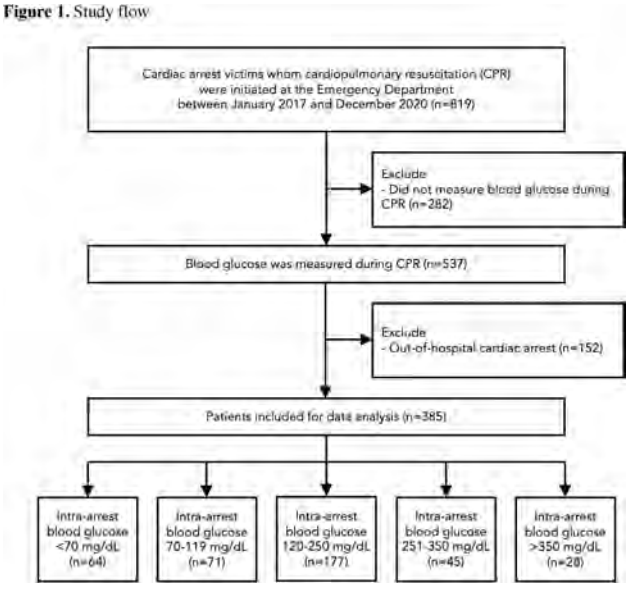
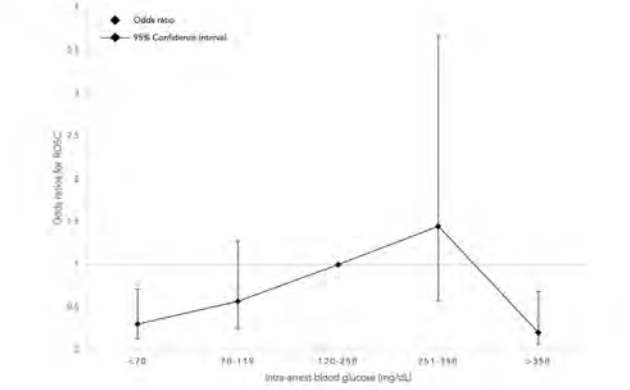


Figure 2. Intra-arrest blood glucose level and the chance of having ROSC. ROSC, return of spontaneous circulation



No, authors do not have interests to disclose

246 A Multidisciplinary Initiative Improves Care for Psychiatric Patients Boarding in the Emergency Department

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Objectives: For many reasons, patients with behavioral health (BH) complaints often board in the ED for many days, many times without treatment. We sought to test if aggressive early intervention for BH patients in the ED may result in decreased ED length of stay (LOS), decreased time to provider, increase in BH patients discharged from the ED, reduction in patients leaving without treatment (LWOT), and reduction in ED restraint use.

Methods: This was a single institution quality improvement initiative. In October 2021, a multidisciplinary team of ED Physicians, Psychiatrists, Social Workers, Nurses,

and administrators met with national leaders in emergency psychiatric care (Vituity, Inc.) to discuss current status and opportunities for improvement. The local team met bi-weekly to continue to clarify interventions and analyze results. Our hospital already has an inpatient psychiatric unit and a psychiatric observation unit. We have 3 inpatient psychiatric services: a teaching service, a county sponsored service that admits their own patients, and a private hospital-based psychiatric service. We have a psychiatric consult service with psychiatry residents available from 1100 AM to 1100 PM 7 days per week, and intermittent coverage of a licensed clinical social worker at other times. Boarding in the ED was identified as a significant issue. The team was unanimous that the underlying issue was lack of inpatient beds. However, we recognized that creating more bed availability was not an achievable short-term goal. We identified several potential interventions that we thought could reduce ED boarding. This included restructuring the physical unit to decrease times to complete medical screening examinations; appropriate use of available psychiatric resources; reducing unnecessary medical workups or laboratory testing on psychiatric patients using evidence based guidelines; early medication intervention for patients with agitation, psychosis, or anxiety; updated order set and process for PRN intervention of agitation; and ownership of re-evaluation and medication management by ED physicians for patients who were awaiting a psychiatric bed. We measured results for each of these outcomes in November and December after gradually initiating the interventions.

Results: Primary BH complaints accounted for 18% of ED visits (599/3311) in November and 15% of ED visits (533/3597) in December. Average time to provider decreased from 30 to 22 min (27%). BH admissions increased from 59% to 70% of patients, but the average ED LOS for these patients decreased 47% from 1156 to 614 minutes. The percentage of BH patients discharged from the ED decreased from 35% to 25% and ED LOS for these patients increased slightly (7%) from 403 to 434 minutes. The number of BH patients who LWOT decreased from 6.5% to 4.1%. Use of 4-point restraints decreased 31% from 16 events to 11 events in the ED and this was mirrored in the entire hospital where events decreased 48% from 44 to 23 events. Total time in restraints for ED patients decreased 49% from 37 hours to 19 hours.

Conclusions: Our multidisciplinary team-based intervention has been well received by all members of the team and resulted in a decreased ED LOS, ED LWOT, and restraint use. Culture change will continue to take time to reinforce and ensure sustainability of these improvements. Future interventions to address this include a change in handoff procedures, a daily rounding initiative, and individual coaching.

No, authors do not have interests to disclose

247 Comparison of Nebulized Sub-Dissociative Dose Ketamine at Three Different Dosing Regimens for Treating Acute Pain in the Pediatric Emergency Department: A Prospective, Randomized Double-Blind Trial

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Objective: Currently, there are no clinical trials evaluating the role of nebulized ketamine in managing pain in the Pediatric ED. Our aim was to assess and compare the analgesic efficacy and rates of adverse effects of ketamine administered via breath-actuated nebulizer at three different dosing regimens (0.75mg/kg, 1 mg/kg and 1.5 mg/kg) for emergency department pediatric patients presenting with acute and chronic painful conditions.

Methods: This is a prospective, randomized, double-blinded trial comparing three doses of nebulized ketamine (0.75mg/kg, 1 mg/kg and 1.5 mg/kg) administered via breath-actuated nebulizer, in pediatric emergency department patients aged 7-17 years old with moderate to severe acute pain. Primary outcome include the difference in pain scores between all three groups at 30 minutes. Secondary outcomes include a need for a second or third dose of ketamine, need for rescue analgesia, and adverse events in each group at 30 and 60 minutes. ANOVA and $\chi 2$ test were used for data analysis. Power analyses indicated the need for 120 patients (40 in each group). The study is registered with www.clinicaltrials.gov; ID: NCT03950817

Results: A total of 41 subjects (n=13, 14, 14 respectively) are enrolled in the study to date: The mean NRS pain scores at baseline are 7.46, 7.93, and 7.29 (p=NS), and at 30 min were 4.54, 4.57, 3.33 (p=NS). The difference in mean pain scores at 30 minutes between the 0.75 mg/kg and 1 mg/kg groups is -0.033 (95% confidence interval [CI]: -2.38 to 1.14), between the 1 mg/kg and 1.5 mg/kg groups is 1.24 (95% CI: -1.14 to 1.15), and between the 0.75 mg/kg and 1.5 mg/kg groups is 1.21 (95% CI: -1.06 to 1.09). No clinically concerning changes in vital signs were observed. No serious adverse events occurred in any of the groups.

Conclusion: Preliminary data analyses indicates that there is no difference between all 3 doses of ketamine administered through breath-actuated nebulizer for short-term treatment of moderate to severe pain in the pediatric emergency department.

No, authors do not have interests to disclose

248 Ultrasound-Guided Transgluteal Sciatic Nerve Block in Emergency Department Patients With Sciatic Radiculopathy: A Multicenter Prospective Study

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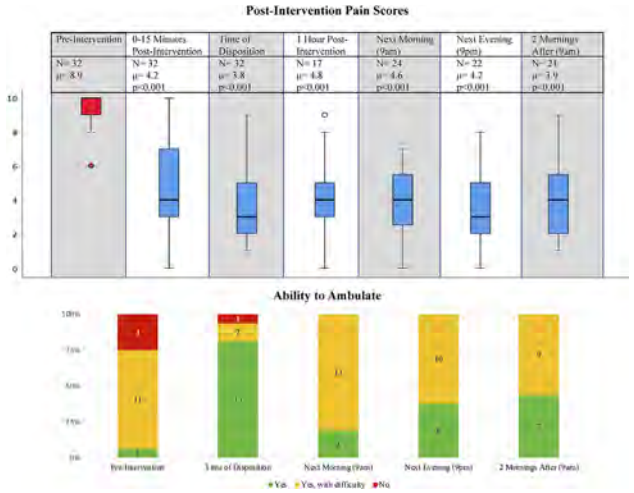
Objectives: Acute-on-chronic pain secondary to sciatica is a common emergency department (ED) presentation and often leads to loss of work, decreased function, and emotional distress. The transgluteal sciatic nerve block (TGSNB) is used by anesthesiologists for chronic, acute, and perioperative sciatic nerve pain. The objective of this study is to assess the efficacy and safety of ED performed TGSNB for acute sciatic radiculopathy.

Methods: This was a multicenter prospective convenience sample of ED patients with acute sciatica among 4 hospitals with a combined patient volume of over 250,000 visits per year. Prior to receiving the TGSNB, patients reported their initial pain score (0-10), completed a short questionnaire of treatments trialed and impact on work, and performed a Timed Up & Go test (TUG). Providers were asked to record the expected disposition for each patient prior to the block. All TGSNBs were performed by ED providers who had completed a 20-minute training session on anatomy review, block technique, and the study protocol. Each TGSNB was performed with 10 mL of 0.5% bupivacaine mixed with 8 mg of dexamethasone. At 15-30 minutes following the intervention, participants provided repeat pain scores, repeated the TUG test, and providers recorded each patient's final disposition. The patients were followed for 72 hours post-intervention and submitted pain scores and self-reported ambulation status at various time points via electronic surveys. Longitudinal variables were compared to the pre-intervention values using paired sample t-tests.

Results: A total of 46 ED TGSNBs were performed during the study period. 32 patients had complete pre- and post-block pain scores, TUG tests, and provider estimated dispositions. 16 patients completed all pain scores and ambulatory status surveys during a 72-hour follow-up period. There were no reported complications (0/46). Among the 32 patients with full periprocedural data, 37.5% reported inability to work due to their sciatica in the 72 hours prior to their ED visit, 68% endorsed the use of NSAIDs, and 16% reported the use of opioids prior to arrival. On average, patients' numerical pain scores (0-10) decreased by 4.72 points (95% CI 3.60 - 5.84, $p<0.01$) 15-30 minutes post-block. A post-block improvement in TUG performance was observed for 71.9% (23/32) of patients, while no change in TUG performance was observed in 25% (8/32) of patients, and a worsened TUG performed was observed in 3.1% (1/32) of patients ($p<0.01$). Prior to the TGSNB, providers estimated that 50% (16/32) of patients would require an observation unit or hospital admission, but post-block, only 19% (6/32) of patients required an observation unit or hospital admission ($p<0.01$). The 72-hour post-block pain and ambulation survey results are reported in Figure 1.

Conclusion: To our knowledge, there are no other multicenter prospective ultrasound-guided nerve block studies in the ED. This prospective study demonstrated that with appropriate training, ED-performed TGSNBs were safe, associated with clinically significant reductions in pain, improved mobility, and improved patient dispositions. Further studies are required to elucidate additional systemic and patient-centered benefits of ED-performed TGSNBs, such as a possible reduction in systemic opioid use and dependence, improved and sustained pain control, prevention of avoidable hospital admissions, shorter ED lengths of stay, and more rapid return to work.



No, authors do not have interests to disclose

249 Differences in Emergency Department Sepsis Care: Do Race, Sex, and Language Matter?

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Study Objectives: Sepsis accounts for half of hospital deaths and is a priority area of quality measurement and improvement by the Centers for Medicare and Medicaid Services (CMS). Social determinants of health have been associated with sepsis outcomes, with racial and ethnically minoritized patients experiencing higher mortality rates and worse outcomes. Standardization of emergency department (ED) sepsis-care protocols and quality measurement have improved sepsis outcomes and are closely tracked. However, it is unknown whether there are differences in ED sepsis care protocol adherence or outcomes by race, sex, or primary language spoken. The Severe Sepsis and Septic Shock Early Management Bundle (SEP-1) measure is a CMS quality measure used to bundle and track multiple elements of sepsis care that are shown to improve sepsis outcomes. This measure includes obtaining blood cultures and serum lactate measurements and timely administration of intravenous fluid and antibiotics, if indicated. In this study, we hypothesized there would be a difference in 3- hour bundle compliance based on differences in race, sex, and/or language spoken.

Methods: We conducted a retrospective chart review of adult ED patients who met SEP-1 reporting guidelines for severe sepsis, septic shock, or sepsis with organ failure, from April 8, 2019 to January 21, 2022 at a large health system in Rhode Island with over 150,000 annual ED visits. We included patients who had 3-hour bundle compliance reported to CMS. Statistical analysis was completed using univariate descriptive analyses and bivariate analyses with a chi-square test of independence. We conducted logistic regression to identify factors associated with 3-hour sepsis bundle compliance and differences in sepsis treatment by race, ethnicity, sex, primary language spoken, and use of an interpreter, adjusting for emergency severity index (ESI), disposition, inpatient department, and COVID test results.

Results: The study population included 3,182 patients of which 44.6% (1418/3182) were female, 78.4% (2495/3182) white, and 11.3 % (360/3182) were Hispanic or Latino. The majority (85.5%, 2722/3182) spoke English. Among people who spoke a language other than English, over two-thirds (66.3%, 305/460) received an interpreter. Less than a quarter 23.5% (749/3182) had severe sepsis, over a third (35.5%, 1131/3182) had septic shock, and 40.9% (1302/3182) had sepsis with organ failure. Overall compliance with the SEP-1 bundle was low at 44.9% (1430/3182). There were no significant differences in sepsis bundle compliance by patient sex, race, ethnicity, or language spoken. Logistic regression showed a lower likelihood of compliance with the sepsis bundle among patients with severe sepsis compared to sepsis patients with organ failure (aOR 0.77 [95% CI: 0.65-0.90]).

Conclusion: Our study did not identify a disparity in SEP-1 bundle compliance by sex, race, ethnicity, or language spoken. These findings support the hypothesis that using standardized ED sepsis protocols and measures are important tools to mitigate and/or prevent disparities in ED sepsis care. We also found low compliance with the SEP-1 bundle, with higher compliance noted among individuals with more severe disease, potentially diluting differences that may exist between demographic groups. Future studies are needed in populations with higher SEP-1 compliance to determine whether there are differences by sex, race, or language spoken.

No, authors do not have interests to disclose

250 Tracking Asthma Medication Use in Children After an Emergency Department Visit With a Smart Inhaler and Connected Mobile Application

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Study Objectives: Asthma is the most common chronic childhood illness and the third leading cause of hospitalization among pediatric patients in the US. It is responsible for more than 1.8 million emergency department (ED) visits per year and represents significant health care burden and costs. The primary objective of this study is to determine the feasibility of employing a "smart" inhaler connected to a mobile application to track asthma inhaler use after an ED visit. Future goals are to determine if regular daily use of a steroid inhaler results in less rescue medication use, and to connect this usage with real time environmental data to build a risk profile to alert patients of conditions that increase risk of asthma exacerbation.

Methods: A cross-sectional cohort study was conducted at a single urban academic hospital pediatric ED between November 2021 and January 2022. Eligibility criteria included age 5-18 years, ED presentation with an asthma-related complaint, access to a blue tooth enabled mobile device, and discharge from the ED with a prescription for albuterol and/or an inhaled steroid. Each study participant was provided an electronic sensor device fitted to the asthma medication inhaler and connected to a mobile application on the patient or caregiver's phone. The "smart" sensor registered an event each time the patient pressed on the inhaler to deliver a puff of medication. Each patient also had a phone follow up within 30 days, and a chart review was conducted to determine if an ED visit occurred within 7 days of the initial ED visit with a related complaint.

Results: Of the 19 patients eligible for the study, 16/19 (84.2%) agreed to participate. Mean age of participants was 9.1 years (95% CI 6.65 to 11.6) and 6/16 (37.5%) were females. 13/16 (81.3%) of patients were English speaking and 3/16 (18.3%) were Spanish speaking. Albuterol was prescribed to all patients while Fluticasone was prescribed to 5/16 (31.2%) of the participants. Successful sensor synchronization was achieved in 4/16 (25%), while the remaining 12/16 (75%) never synchronized their sensor to the mobile app. On a 30-day phone follow up and chart review, 1/16 (6%) patients had an ER return within 7 days of enrollment, and 3/16 (18.8%) were not successfully contacted on follow up. Overall, the system successfully registered 31 medication dose events and sent email notification to the clinician in every instance.

Conclusion: Our study is a successful proof of concept, demonstrating moderate feasibility of real-time tracking of pediatric inhaled asthma medication using a "smart" inhaler device after an ED visit. Further studies are in development to construct an asthma risk profile by connecting medication use events and environmental data as a predictive tool to prevent future asthma exacerbations.

No, authors do not have interests to disclose

251 Emergency Department Arrival by Ambulance for Patients Receiving a Pulmonary Embolism Diagnosis Is Associated With Hospitalization: Is Coming from Off-site Radiology an Exception?

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Study Objectives: Arrival at U.S. emergency departments (EDs) by emergency medical services (EMS) is a marker of acuity, associated with three times the rate of hospitalization compared with other transports. But ED EMS arrivals are not a homogenous group. EMS is often engaged because of worrisome symptoms, requiring timely care and transport for ED management. This is usually the case with ambulatory patients who go on to receive an ED diagnosis of acute pulmonary embolism (PE). Some patients arriving at the ED by EMS, however, had just completed an outpatient-based diagnostic evaluation with pulmonary imaging at an off-site radiology clinic. The newly-discovered PE may prompt the clinician to call 911 for EMS transport, simply because the diagnosis can be high-risk, even if the patient is not clinically unstable. It is unknown how the origin of EMS transport (radiology vs not) may be associated with subsequent ED/hospital management. We hypothesized (1) that ED patients with acute PE who arrived by ambulance were higher risk than their non-EMS counterparts and (2) that patients coming from off-site radiology were a lower acuity group than those who arrive by ambulance from other origins, as measured by the incidence of expedited discharge (<24h) from the hospital.

Study Design/Methods: The retrospective cohort study included all non-pregnant ED adults (≥18 years) treated for acute PE in one of 21 community EDs across a U.S. integrated health system from 01/2013— 4/2015. We gathered demographic and clinical variables from comprehensive electronic health records and structured manual chart review. We used the validated PE Severity Index (PESI) to estimate short-term mortality risk. Our primary outcome was expedited discharge home within 24h of ED registration. We also report 30-day all-cause mortality. For comparisons, we used unpaired t-test, chi-square, and Fisher's exact test.

Results: We included 2,996 ED patients with acute PE, 644 of whom (21.5%) arrived by EMS. Compared with the non-EMS arrivals, the EMS group was older, mean age 70.5 years versus 62.1 years (95% CI 7.0 – 9.8 for difference in mean age), and had higher risk PESI classification, fewer expedited discharges, and higher mortality (p <0.001 for all) (Table). Among the EMS transports, only 16 patients (2.5%) arrived from off-site radiology. Compared with non-radiology origins, patients transported from radiology had higher expedited discharge: 25.0% vs 8.8% (p=0.05), with a difference of 16.2 percentage points (95% confidence interval: −5.1 to 37.6). Patients coming from radiology were more commonly lower risk via PESI classification and had lower 30-day mortality, though these differences were not statistically significant (Table).

Conclusion: Among ED adults with acute PE, those who arrived by EMS were significantly more likely to be higher risk on the PESI, to stay longer than 24h, and die within 30d. Only <5% of EMS transports originated from off-site radiology clinics, arriving with a PE diagnosis in hand. This sub-group may be more likely to receive expedited discharge. A larger study is needed to overcome the limited sample size.

Table. Characteristics of emergency department patients with acute PE, stratified by EMS transport and off-site radiology

	EMS Transport (n=2,996)		EMS Transport from Off-site Radiology (n=644)	
	No	Yes	No	Yes
Characteristics	2352 (78.5)*	644 (21.5)	628 (97.5)	16 (2.5)
Age, y, mean	62.1	70.5†	69.4	70.5
Sex, male	1182 (50.3)	303 (47.0)	294 (46.8)	9 (56.3)
PE Severity Index				
Classes I-II (lower risk)	1035 (44.0)	134 (20.8)†	129 (20.5)	5 (31.3)
Classes III-V (higher risk)	1317 (56.0)	510 (79.2)†	499 (79.5)	11 (68.7)
Expedited discharge <24h	620 (26.4)	59 (9.2)†	55 (8.8)	4 (25.0)‡
30-day all-cause mortality	41 (1.7)	31 (4.8)†	31 (4.9)	0

* *No. (%) throughout, except for age.*
P value for comparisons (no vs yes) >0.05, unless noted: †*<0.0001;* ‡*=0.05*

No, authors do not have interests to disclose

252 Predicting Adverse Events: Site Differences Using the Emergency Department Trigger Tool

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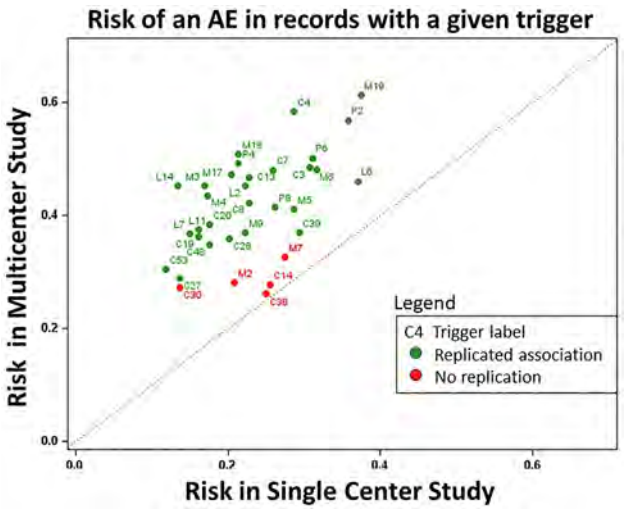
Study Objectives: We previously validated the triggers in the Emergency Department Trigger Tool (EDTT) against manual review and described performance of the tool for detecting AEs in a single center study. In this interim analysis of data from an ongoing international, multicenter study, we report on performance characteristics of the tool in detecting AEs overall and differences across sites.

Methods: This is a multicenter, retrospective study at 3 urban academic EDs. Patients >18 years completing an ED visit were eligible. We ran the EDTT query on electronic record data for ED visits in 09/2019 through 03/2021, sampling triggered records for dual independent RN and confirmatory MD review for AEs. We sought to confirm in a multicenter fashion, the bivariate associations of triggers and AEs observed in our single center study; compare the odds of an AE per increase in triggers; and evaluate predicted vs. observed AE risk modeling performance of a pooled model on individual site data. The data were randomly split (80- 20) into training and testing sets. P-values were adjusted for multiple comparisons using the Benjamini- Hochberg procedure.

Results: We identified 635 ED AEs in 2,134 records reviewed (23% with one or more AEs). Adjusting for age, sex and acuity, the average incremental odds of an AE per trigger present was 1.3, and highly consistent across sites (1.2 – 1.4) and compared to our single center study (1.4). Bivariate associations of triggers with AEs were highly conserved (Figure 1) and prediction of AEs using a pooled model performed well across sites, albeit with a tendency to over-predict AEs (ie, predicted AE risk > observed in the test sample). Some of the observed variation is likely due to a still relatively small sample size. That said, a threshold of 30% predicted risk using this model would flag ~4% of all records with >1 triggers (or 9,625 records in our dataset) as targets for potential review. Of these, 52% would be expected to yield one or more AEs (ranging from 45% to 61% across sites). There would be little gain in using a looser selection rule, unless the suspected underlying AE rate is much higher than 4 or 5% (otherwise, the majority of selected records would not carry AEs).

Conclusion: In this interim analysis of a multicenter study, we replicated the performance of the EDTT in identifying AEs, demonstrating increasing detection with increasing number of triggers. We confirmed bivariate associations of triggers and AEs and found good performance of the EDTT when using a pooled trigger model on site-specific data. As data continue to accrue, we will update the predictive models, including models specific to certain AE types. We will make the EDTT query code (for Epic) and documentation guides and training materials freely available by the conclusion of the study.



No, authors do not have interests to disclose

253 Pharmacologic Therapy for Migraine Headache in the Emergency Department: A Bayesian Network Meta-analysis

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Study Objectives: Rapid relief of migraine headache in the ED is important to both patients and providers. Multiple pharmacological agents have been studied, alone or in combination, but direct comparisons of all agents are limited. The goal of this investigation was to determine which pharmacological agent(s) are most effective and safe for rapid migraine pain relief in adult patients presenting to the ED.

Study Methods: We conducted a systematic review and Bayesian network meta-analysis (NMA) of randomized controlled trials that examined the efficacy of various agents, alone or in combination, for treatment of the adult ED patient with migraine headache. We searched PubMed, Embase, CINAHL, Web of Science, and Cochrane Library/Central from inception to March 2022. We extracted data according to PRISMA-NMA and appraised trials using Cochrane RoB 2. We performed Bayesian NMA with random- effects model and vague prior distribution to calculate odds ratios with 95% credible intervals for these outcomes: 1) adequate pain relief within 120 minutes, 2) need for rescue drug, 3) significant adverse event (sedation, akathisia, dystonia, hypotension), and 4) migraine recurrence. We used surface under the cumulative ranking curve (SUCRA) to rank agent(s). We assessed confidence using CINeMA.

Results: Seventy-eight studies were initially eligible among 4,734 identified. NMA of data from 24 trials (n=2,357) demonstrated that chlorpromazine IV/IM (SUCRA 87.3%) and prochlorperazine IV/IM (SUCRA=81.2%) ranked highest for adequate pain relief within 120 minutes. NMA of data from 28 trials (n=2,953) demonstrated that chlorpromazine IV/IM (SUCRA=98.1%) ranked highest for need for rescue drug. NMA of data from 23 trials (n=2,389) demonstrated that propofol (SUCRA=8.2%) ranked lowest for significant adverse event. NMA of data from 16 trials (n=1,510) demonstrated that chlorpromazine IV/IM (SUCRA=81.6%) and dexamethasone IV (SUCRA=78.2%) ranked highest for migraine recurrence. In general, within-study bias and imprecision resulted in low confidence.

Conclusion: The evidence to determine the most effective drug(s) for pharmacologic therapy of migraine headache in the ED is uncertain. Parenteral chlorpromazine might be the most effective single agent. Propofol might be the least safe. Parenteral dexamethasone might prevent migraine recurrence. Further, high-quality direct-comparison studies are recommended.

No, authors do not have interests to disclose

254 Does Video Pre-Briefing Reduce Cognitive Load During a Simulated ACLS Scenario?

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Study Objectives: Pre-briefing provides orientation to the simulation environment, introduces the case scenario, and has been shown to improve learning outcomes. There is a paucity of prior research that evaluates how the various components of pre-briefing used in simulation activity impact students' cognitive load (CL). We conducted a prospective study to assess student cognitive load and learning when video examples vs. verbal pre-briefing were provided prior to a simulation training activity.

Study Design/Methods: We enrolled, consenting resident nurses in a prospective, quasi-experimental, two- group, comparison study at an urban hospital simulation center. Participants were randomized to receive either pre-briefing with video example or verbal pre-briefing only, respectively. Subsequently, they participated in a simulated ACLS Code Blue event: bradycardia to VF to PEA to ROSC. Participants' scenario performance was measured by a certified ACLS instructor using the American Heart Association (AHA)/Advanced Cardiac Life Support (ACLS) critical criteria and through software analysis of simulation sensors. Each subject also completed a post-activity written survey that included validated questions designed to assess components of CL. Continuous data are presented as means+/-SD and were analyzed by t-tests. The primary outcome parameter was to compare mean scores for total CL between the video and verbal pre- briefing groups. Secondary outcomes included comparison of performance parameters as well as measures of intrinsic (IL) and extraneous cognitive load (EL).

Results/Findings: There were 30 participants; 13 in the video pre-briefing group. There was no significant difference between the video vs. verbal pre-briefing groups with respect to mean extraneous load (3.19+/-1.78 vs. 4.16+/-2.70; p=0.1). However, there were significantly lower mean scores for IL in the video group (5.92+/-1.64 vs. 7.19+/-1.48; p=0.04). With respect to the primary outcome, there was a trend toward lower total CL in the video group, but this did not reach statistical significance (4.55+/-1.30 vs. 5.68+/-1.60; p=0.05). In terms of ACLS scenario performance, there were no differences with respect to the following measures: compression rate, compression depth, flow fraction, chest recoil, successful completion of 4 critical actions for management of bradycardia, successful completion of 5 critical actions for management of ventricular fibrillation, and total management scores.

Conclusion: We found that IL was significantly lower in resident nurses that viewed a pre-briefing video than those that did not. Future investigators should evaluate participant performance for simulated ACLS scenarios using an inductive qualitative methodology to provide a more granular assessment of any behavioral differences between video pre-briefing and control groups.

No, authors do not have interests to disclose

255 Delivery of Epinephrine by Metered-Dose Inhaler for the Treatment of Croup in Children

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Study Objective: Croup, also known as laryngotracheobronchitis, is a common pediatric presentation in the emergency department. When children present with moderate or severe croup, epinephrine, either racemic or L-isomer, given by nebulization is considered standard of care. Since the beginning of the SARS-CoV-2 pandemic, many medical institutions have moved away from the delivery of medications by nebulization whenever possible in order to prevent aerosolization of the SARS-CoV-2 virus and infecting others in close proximity. Delivery of respiratory medication by metered-dose inhaler (MDI) was the most commonly adopted method to replace nebulization. Primatene® MIST (Armstrong Pharmaceuticals) is an over-the-counter, L-epinephrine MDI. In February 2021, the Pediatric Service Line Pharmacy and Therapeutics Committee of the Northwell Health system approved the use of Primatene® MIST in children >= 1 years old presenting to the emergency department with croup as an alternative to nebulized epinephrine. We aim to demonstrate that L-epinephrine administered by MDI is safe and effective in children presenting with moderate croup.

Study Design/Methods: We conducted a single-center retrospective chart review study of children 1 to 17 years of age who presented to the emergency department at Cohen Children's Medical Center and were evaluated for suspected croup from March 2021 until May 2022. As part of a surveillance and later reapproval process by the Pediatric Service Line Pharmacy and Therapeutics Committee of the Northwell Health system for Primatene® MIST, data was prospectively collected and entered into a REDCap database. This included Westley Croup Score, requirement of additional doses of epinephrine, adverse events, disposition, and return within 48 hours. During the initial rollout, eligible patients were administered 4 puffs through an attached spacer. Following safety review, dosing was increased to 6 puffs.

Results: A total of 24 pediatric patients with croup received Primatene® MIST. The mean age was 3.3 years (SD:2.3 years) and 75% were male. Of the 16 patients who had respiratory viral testing, 19% tested positive for SARS-CoV-2 virus. The median Westley Croup Scores at presentation was 3 (IQR:2,3; Range:2-5), 0 (IQR:0,1; Range:0-4) at 30 minutes and 0 (IQR:0,1; Range:0-3) at 120 minutes following Primatene® MIST administration. A second dose of epinephrine (nebulized or MDI) was administered to 7 patients (29.2%;CI:14.9%-49.2%). Only 1 patient (4.2%) was admitted and 1 (4.2%) returned within 48 hours. There were no reported adverse events.

Conclusion: Epinephrine administered by MDI is a safe and effective treatment for moderate croup. It should be considered as an alternative to nebulized epinephrine when there are concerns for infectious aerosolization.

No, authors do not have interests to disclose

256 Trends in Opioid Overdoses During the COVID-19 Pandemic

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Study Objectives: As of April 2022, the United States has reached 100,000 drug related deaths in the year preceding. During the COVID-19 pandemic, the national trend of overall emergency department (ED) visits have decreased, while the number of opioid overdoses have increased. However, it is unclear which patient populations are suffering the most from the compounded effect of the opioid overdose epidemic and the COVID-19 pandemic. The goal of this project was to quantify the number of visits to the Loyola University Medical Center (LUMC) ED for opioid overdose during the COVID-19 pandemic compared to a historical control.

Study Designs/Methods: This was a single-center, retrospective cohort of ED visits between March 2019-February 2020 (pre- pandemic) and March 2020-February 2021 (pandemic). Patients were identified using International Classification of Diseases-10 codes consistent with opioid overdose. Patients were excluded for the following reasons: missing or incomplete data, outside hospital transfer, or left before being seen by a physician. The primary endpoint was the proportion of patients presenting to the ED with a chief complaint of opioid overdose. Secondary endpoints included co-ingestion of other substances including alcohol, cocaine, and benzodiazepines, disposition, and median number of ED visits related to intoxication per patient.

Results: Overall, 588 patient charts were reviewed, of which 420 were included. The most common reason for exclusion was opioid intoxication without definitive evidence of overdose, such as naloxone administration or physical exam findings. The pandemic group had 230 overdoses compared to 190 in the pre-pandemic group. Baseline demographics were similar between groups, though significantly more pandemic group patients were male (85.7% vs 78.4%, $p=0.05$) and Hispanic/Latino (13.5% vs 6.8%, $p=0.03$). The total number of LUMC ED visits decreased by 17.5% with 38,653 pandemic visits down from 46,877 pre-pandemic visits. Overdoses accounted for 0.60% of pandemic ED visits compared to 0.41% of pre-pandemic ED visits ($p<0.0001$). Pandemic overdoses had higher rates of co- ingestion with benzodiazepines (14.4% vs 3.2% $p<0.001$), cocaine (17.4% vs 9.5% $p=0.02$), and alcohol (15.7% vs 14.2% $p=0.68$). There was no significant difference in discharge, admit, or transfer rates between the groups ($p=0.10$). There was a non-significant increase in the median number of ED visits per patient related to intoxication during the pandemic (2 vs 1, $p=0.34$).

Conclusion: During the pandemic, there was a significant increase in the proportion of ED visits for opioid overdose and overdoses with co-ingestion of benzodiazepines and cocaine. Men and Hispanic/Latinx patients were disproportionately affected. This observed increase in proportion of care in the pandemic for opioid overdose suggests that opioid use is increasing, emphasizing the need for additional harm reduction, addiction medicine and psychosocial services.

No, authors do not have interests to disclose

257 Exploring Brain Natriuretic Peptide and Subclinical Heart Disease in Emergency Patients With Asymptomatic Hypertension

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Background: Nearly half of patients who visit the emergency department (ED) in the United States have asymptomatic hypertension (HTN), and this disproportionately affects Blacks. Subclinical heart disease (SHD) (systolic and/or diastolic dysfunction) is ubiquitous, affecting more than 90% of ED patients in some studies, leading to conditions such as congestive heart failure (CHF). Identifying a biomarker/point-of-care test that may serve as a surrogate for detecting SHD may improve vigilance with follow up to primary care from the ED for treatment, and the development of secondary complications from having SHD.

Study Objectives. Brain natriuretic peptide (BNP) levels well below contemporary thresholds used for the diagnosis of CHF are associated with adverse cardiovascular outcomes in community patients with asymptomatic HTN. The objective of this study is to determine the diagnostic accuracy of BNP for predicting echocardiographic evidence of SHD in emergency patients with asymptomatic uncontrolled HTN.

Study Design/Methods: This is a multi-center prospective observational proof of concept study. A series of sample calculations determined a convenience sample of N=76 is necessary to achieve our objective. Adults ($\geq$ 18 years old) who have asymptomatic (ie no chest pain) HTN (BP $\geq$ 160/100 mmHg and 2nd $\geq$ 140/90 mmHg) are being recruited from two urban EDs in New York City. Patients with a history of CHF, renal insufficiency, and cardiovascular comorbidity, are excluded. BNP levels are categorized into high and low BNP levels, according to values above and below the 80th percentile (BNP 20 pg/ml for men and BNP 23.3 pg/ml for women). EKG evidence of left ventricular hypertrophy (LVH) by Cornell Voltage Criterion and evidence of SHD are collected. Preliminary results are described.

Results/Findings: A total of 32 patients have been recruited from one ED-site thus far. Roughly half are male (n=15; 47%) or female (n=17, 53%). A majority(93%) self-identified as Non-White (Black, Hispanic, Asian, Other) (n=30). Additional analyses will be performed on demographics upon study completion. Two patients were missing an ultrasound , leaving 30 participants for analysis. Eighty-seven percent (n=26) have evidence of SHD, a majority having left ventricular hypertrophy (n=20; 77%), and fifty-seven percent (n=15) also had an abnormal BNP level. Very few (n=3, 9.6%) had EKG evidence of left ventricular hypertrophy. We did not perform bivariate analyses due to the small sample size.

Conclusion: The majority of emergency patients who have asymptomatic HTN have an elevated BNP and/or echocardiographic evidence of SHD, which is consistent with the literature to date. A receiver operator curve will be calculated to predict echocardiographic evidence of SHD upon study completion. Future work may include comparison of other biomarkers to determine the most sensitive marker for detecting SHD.

No, authors do not have interests to disclose

EMF

258 Students' Perspectives of a First Year Firearm Injury Prevention, Risk Assessment and Counseling Curricular Intervention

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Study Objectives: In 2020, there were more than 45,000 deaths from firearms in the United States. Despite growing evidence that physician counseling can impact firearm safety behaviors, few physicians regularly counsel patients. Medical students are rarely exposed to these topics in their undergraduate medical education. This work sought to address this gap by implementing an educational session for early preclinical medical students. Our objective was to introduce firearm injury epidemiology, risk assessment, and counseling strategies into a required clinical skills course and to evaluate students' perspectives on the session and the inclusion of firearm injury prevention in their curriculum.

Methods: The single session intervention was administered to all first year medical students at Alpert Medical School of Brown University in 2021. The session included pre-session readings, an interactive lecture, and small group practice cases. The session was evaluated using a voluntary post-session feedback survey and two student focus groups. Two study authors independently coded all data using NVIVO software. Coding was completed using a combination of deductive codes generated from an initial literature review and inductive codes that emerged during analysis, with discrepancies resolved through regular meetings and discussions.

Results: The single session was administered to all first year medical students (n=146). 59 of 146 students completed the voluntary post-session survey. Most agreed or strongly agreed that they learned new skills related to firearm safety counseling (89.8%), and that their attitudes about physician counseling relating to firearm injury prevention changed (61%). Students identified the provided example counseling phrasing, concrete patient examples, and practice cases as strengths of the session. Students suggested lengthening the in person session, including more real-world case examples, and adjusting and adding to pre-work resources. Two focus groups were conducted (total n=15) three months following the session. Coded themes indicated that students were receptive to this curriculum, and that the session helped them understand the clinical applications of firearm risk identification and counseling. However, the students noted that the session was only an introduction and felt the topic deserved additional curricular time and integration with other parts of the clinical

curriculum. In particular, students were eager to hear from firearm owners, in part due to a perceived lack of cultural competency and fear of coming across as judgemental or politically motivated.

Conclusion: This curriculum fills a critical gap in undergraduate medical education. Our results indicate that most students are interested in this topic, recognize its value, and feel it is an appropriate part of medical school curricula. Students felt that a single session was insufficient to fully address this topic and requested greater integration with other clinical topics and the inclusion of perspectives from firearm owners/users.

No, authors do not have interests to disclose

259 Outcomes and Resource Utilization of Patients Presenting to the Emergency Department With Opioid and Benzodiazepine Poisoning

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Study Objectives: Recent literature shows many overdose deaths are associated with co-use of opioids and other drugs, such as benzodiazepines. However, the literature is sparse surrounding the characteristics and associated factors of people with co-use. Additionally, there are limited data evaluating treatment, outcomes, costs, disposition, and resource utilization related to co-users compared to those who use opioids alone.

Methods: This is a retrospective review of ED data available for the state of Maryland through the Healthcare Cost and Utilization Project (HCUP) database from 2016-2018. We included patients who presented to the ED with benzodiazepine and opioid co-exposures as well as those with opioid exposures alone. Cases were identified using ICD-10 codes T42.4, T40.1, T40.2, and T40.4. We summarized data using descriptive statistics and compared demographics, co-morbidities (including psychiatric co-morbidities), and patient outcomes over the span of a year such as repeat ED visits, repeat hospitalizations, inpatient admissions, and mortality using Welch's t-test between groups. We also compared resource utilization such as number of naloxone administrations, mechanical ventilations, whether CT imaging was performed, cost, and length of stay (LOS) between groups. We used logistic regression to determine if the above variables were predictive of co-use. All findings were reported to the 0.05 significance level.

Results: There were 301 (3.2% of all opioid exposure visits) ED visits related to opioid and benzodiazepine exposures, and a total of 9,335 of visits related to all opioid exposures alone. Patients who were co-users had baseline differences in demographics and co-morbid conditions. They were older ($p=0.001$), more commonly white ($p<0.00001$), female ($p<0.00001$), and had long term opioid use ($p=0.007$). They also were sicker, with a larger percentage having conditions such as hyperlipidemia ($p=0.0003$), diabetes ($p=0.02$), and hypertension (0.0001). Additionally, more of these patients had psychiatric conditions such as mood and anxiety disorder ($p<0.00001$). Table 1 lists comparisons of baseline characteristics. There was no difference in naloxone administrations (8% vs. 10.5%, $p=0.12$) and CT imaging (9% vs. 7.4%, $p=0.36$) between groups, but there were more patients who required mechanical ventilation (6.3% vs. 0.9%, $p=0.0002$). There is no difference in repeat hospitalizations, repeat ED visits, and mortality, but there is a difference in cost of care ($p<0.0001$) for the initial ED visit since more co-users were admitted (average LOS 4.2 days versus 0.4 days, $p<0.00001$). The regression model demonstrated that the only predictor of co-use was presence of a mood disorder (aOR : 1.06, 95% CI: [1.01,1.11], $p=0.03$). Opioid use disorder, cocaine or other stimulant use disorder, nicotine dependence, demographics, alcohol related disorders, and family history of drug abuse were non-predictive.

Conclusion: There was only one predictor of co-use of opioids and benzodiazepines among those that came to the ED; however, there are significant differences in ED resource utilization such as mechanical ventilation and greater cost due to increased LOS. There are also noticeable differences in demographics and medical history between groups. Understanding these differences can help policymakers create targeted interventions to support this population and maximize resource utilization in the ED. Future studies should evaluate more recent trends.

Table 1: Univariate Comparisons of Demographics and Medical Conditions Between Patients that Presented to the ED with opioid and benzodiazepine co-exposures versus opioid exposures alone

Variable	Concurrent Benzodiazepine and Opioid Exposure (%, 95% CI, N)	Opioid Exposure Alone (%, 95% CI, N)	p-value
Age (mean years)	43.2 (41.4, 45.0)	40.2 (39.9, 40.5)	0.001
White	74.8% (69.8, 79.7), 225.0	61.9% (60.9, 62.9), 5592.0	< 0.00001
African American or Hispanic	21.6% (16.9, 26.3), 65.0	35.0% (34.1, 36.0), 3165.0	< 0.00001
Female	47.8% (42.2, 53.5), 144.0	32.1% (31.2, 33.1), 2902.0	< 0.00001
Married	20.3% (15.7, 24.8), 61.0	13.9% (13.2, 14.6), 1255.0	0.007
Medicaid	46.2% (40.5, 51.8), 139.0	55.1% (54.1, 56.1), 4978.0	0.0025
Medicare	24.6% (19.7, 29.5), 74.0	12.2% (11.5, 12.8), 1099.0	< 0.00001
Private Insurance	22.3% (17.5, 27.0), 67.0	14.6% (13.8, 15.3), 1315.0	0.0017
Uninsured	5.3% (2.8, 7.9), 16.0	15.1% (14.3, 15.8), 1363.0	< 0.00001
Diabetes Mellitus	12.0% (8.3, 15.6), 36.0	7.7% (7.1, 8.2), 692.0	0.024
Hyperlipidemia	12.6% (8.9, 16.4), 38.0	5.6% (5.1, 6.0), 503.0	0.0003
Obesity	10.3% (6.8, 13.8), 31.0	2.9% (2.6, 3.2), 262.0	0.00004
Hypertension	34.6% (29.1, 40.0), 104.0	21.7% (20.8, 22.5), 1958.0	0.00001
Ischemic Heart Disease	7.3% (4.4, 10.3), 22.0	4.0% (3.6, 4.4), 358.0	0.028
Mood Disorders	55.1% (49.5, 60.8), 166.0	22.6% (21.8, 23.5), 2046.0	< 0.00001
Anxiety Disorder	27.6% (22.5, 32.7), 83.0	8.9% (8.3, 9.5), 805.0	< 0.00001
Family History of Drug Abuse	0.7% (-0.3, 1.6), 2.0	0.1% (0.0, 0.1), 6.0	0.20
Opioid Use Disorder	41.2% (35.6, 46.8), 124.0	33.4% (32.4, 34.4), 3019.0	0.007

No, authors do not have interests to disclose

260 Improving Patient Satisfaction With Mobile-Based Real-Time Results Sharing in the Emergency Department

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Study Objectives: 1) To improve patient experience in the emergency department (ED) with minimal disruption to provider workflow through sharing of real-time results and status updates with patients on a mobile platform.

Methods: Patients were recruited at a medium-sized metropolitan emergency department and enrolled onto a HIPAA secure, EHR integrated mobile communication platform with the capability to send messages, screen recordings, and image results directly to patients. Patient content was generated in real-time by research coordinator and piloted over two Plan-Do-Study-Act (PSDA) cycles measuring feasibility and impact. In iteration one, coordinator provided the following information to patient, after consulting with provider: platform instructions, name of provider, curated lab results, all imaging results, and pertinent discharge instructions. Following the completion of iteration one, feedback from ED clinical and non-clinical staff was

used to make the following changes for iteration two: patients received additional elements of a pre-recorded introduction video to the emergency department, status updates regarding timing of orders and scans, and a post visit survey. Disruptions to workflow, engagement with content, and patient feedback were assessed in iteration one. Engagement, timing, and patient satisfaction were assessed in iteration two.

Results: We enrolled 23 randomly selected patients (48% female, 52% male, mean age: 48.2) into two PDSA cycles (N = 12 and 11). Recruitment occurred across 10 ED shifts with six participating providers (five physicians, one physician assistant). Patient demographics were comparable across iterations. Specifically, percent acuity of patients with emergency severity index (ESI) score <3 in iteration 1 (58%) was similar to iteration 2 (68%), and average length of stay in iteration 1 (381 mins) was similar to iteration 2 (330 mins). More patients in iteration 2 were discharged vs admitted (88% discharged) compared to iteration 1 (42% discharged). Main improvements between iteration one and two included standardizing patient onboarding and constructing templates for content generation. One incidence of extended provider-patient contact in iteration one was reported where patient sought out provider to ask about ECG results. No incidences were reported in iteration two. Patient engagement with personalized content was high in iteration 1 (33 out of 35 items viewed, 94%) and remained high in iteration 2 when content was standardized (36 out of 50, 72%). Engagement with patient care status updates was high (94% viewed). Open-ended patient surveys (N=9) from iteration 2 showed patients "found real-time information sharing useful" (item 1), endorsed real-time information sharing for others (item 2), and would want real-time information for subsequent ED visits (item 4). Patients reported: "it put me at ease," "made the care more interactive," "helped me feel more aware of what was going on," and "helped make the waiting better." Length of stay was not correlated with content engagement, patients with length of stay >120 mins were more likely to view all content.

Conclusions: Real-time information sharing through a mobile app-based interface in the emergency department is feasible and leads to increased patient satisfaction with low workflow impact or required provider involvement.

Yes, authors have interests to disclose
Disclosure: Playback Health
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Playback Health
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Consultant/Advisor
Playback Health

261 Racial and Ethnic Disparities in the Use of Computed Tomography With Angiography (CTA) for the Diagnosis of Pulmonary Embolism (PE)

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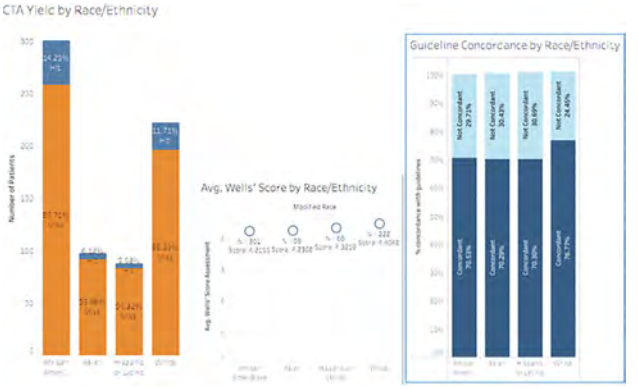
Study Objective: Current guidelines or the utilization of CTA in the diagnosis of PE, mostly relying on Wells' Score for Pulmonary Embolism and D-dimer cut-off levels, have not been examined in different racial and ethnic groups. Barriers to such research have historically included difficulty in capturing a full and objective set of data that includes: CTA ordering, Wells' scores, and PE data across diverse cohorts.

Methods: We developed an electronic health record (EHR) integrated tool that 1) automatically calculates Wells' score and 2) reliably captures diagnosis of PE that could be deployed 3) across different racial and ethnic subgroups. We then calculated CTA yield and % concordance to CTA ordering guidelines in this diverse patient cohort. Adherence to guidelines was considered concordant if [Well's Score > 4] or [Well's Score <= 4 with D-Dimer > 500] and CTA was ordered. Data was analyzed with chi-squared at $p<0.05$ for significance.

Results: We captured data for 1,980 patients (824 White, 558 Black, 88 Hispanic or Latino, 303 Other/Multiracial, and 207 Asian) from three metropolitan emergency departments from September 2021 to December 2021. Average Wells' score was slightly higher for White patients (4.46) compared to patients of other races/ethnicities (4.22 Black, 4.32 Hispanic or Latino, and 4.23 Asian). CTA yield (blue bar in Figure 1) for Black patients (14.4%) was significantly higher than CTA yield for Asians (6.25%), ($X2 = 6.36$, $p = .01$). For CTAs ordered, concordance to guidelines was higher, but not significantly, for White patients (76.7%) than patients of other races and ethnicities (Black 70.6%, Hispanic or Latino 70.3%, and Asian 70.7%), ($p = .18$).

Conclusion: Physicians ordered CTAs according to guidelines approximately the same across race/ethnicity: there was slightly better concordance for Asian patients and similar concordance for Black and White patients. However, CTA yield varied widely across Black, White, and Asian patients. This discrepancy suggests that current guidelines on the use of CTA for PE would benefit from more research into racial and ethnic disparities.



No, authors do not have interests to disclose

262 Developing Novel Tools for Clinicians to Discuss Immigration for Resource Referral in the Emergency Department

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Study Objectives: To address knowledge gaps about immigration, we are developing emergency department (ED) clinician-focused tools at our urban, safety net, academic-affiliated Level I trauma center. Many of the 2 million undocumented people in California depend on the ED for care due to significant health care barriers; however, ED training on immigration is currently lacking. Our objective was to perform a thorough needs assessment via interprofessional interviews to further explore barriers to clinician training on immigration in the ED to help shape the development of targeted educational materials to ultimately better serve the needs of this underserved group.

Methods: The needs assessment consisted of eleven 30-minute interviews with stakeholders; 35 immigration legal organizations in the Bay Area were invited and snowball sampling was used to further recruit participants. In total, we interviewed 3 law firms, 2 legal organization coalitions, 2 Department of Public Health employees, 2 clinicians, and 2 social workers. Two researchers took detailed notes during each interview. Interviews were qualitatively analyzed for recurrent themes. Discrepancies were discussed amongst the researchers until consensus was reached.

Results: Interviews validated the need for legal resource referral tools in the ED, while also highlighting other critical gaps in clinician knowledge. The most salient theme was the priority for legal resources for this patient population above other resources. Additionally, interviewees noted a knowledge gap on types of immigration status, immigrant rights, and who has access to citizenship status in the medical record. Our stakeholders shared concern that clinicians lacked the training on navigating immigration conversations effectively without inducing stress or developing mistrust. Lastly, stakeholders repeatedly mentioned the need to train clinicians on the workflow and rights in the presence of police or immigration and customs enforcement (ICE). Following these interviews, we designed the following tools to address these needs: a digital resource referral tool, handouts on immigration topics and patient rights, a detailed workflow for clinicians for ICE encounters in the ED, and 2 resident didactic sessions to solidify these topics and introduce the tool set.

Conclusion: The results from these interviews expand the role of the Emergency Clinician; in addition to strong clinical knowledge, stakeholders highlighted the responsibility of ED clinicians to be familiar with social resources to help address social determinants of health. Considering the high population of immigrants in California, this responsibility is even more salient. Our in-depth needs assessment highlighted specific objectives that are lacking in ED clinician training, and in response, our team is employing interventions to address these gaps and improve holistic patient care. Future plans include collecting feedback from clinicians on the functionality of these tools,

interviewing immigrant patients to assess the impact of these tools on their wellbeing, and evaluating clinician learning on immigration.

Yes, authors have interests to disclose
Disclosure: FujiFilm - SonoSite
Consultant/Advisor
FujiFilm – SonoSite

263 Emergency Department Care Transition Barriers: A Qualitative Study of Care Partners of Older Adults With Cognitive Impairment

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Background: Persons living with dementia (PLWD) seek care in the emergency department (ED) at higher rates than their cognitively intact counterparts and account for nearly 2 million visits annually. With the majority of PLWD discharged, ED-to-community care transitions represent a particularly vulnerable time period for care partners of PLWD and older adults with mild cognitive impairment (MCI). We sought to identify the barriers experienced by care partners of PLWD and older adults with MCI during ED-to-community care transitions, in order to generate new insights into ways of improving the ED discharge process and to inform intervention development.

Methods: We conducted a qualitative study of 25 care partners of PLWD and older adults with MCI discharged from four EDs. We performed cognitive assessments of older adults using the validated 4AT and care partner-completed AD8 screening tools, respectively to exclude care partners of older adults with concern for delirium and include older adults with concern for newly identified MCI. We constructed a conceptual framework a priori to guide the development and iterative revision of a codebook, used purposive sampling, and conducted recorded, semi-structured interviews using a standardized guide. Two researchers coded the professionally transcribed data using a combined deductive and inductive approach and analyzed transcripts to identify dominant themes and representative quotations. Discrepancies were adjudicated by team consensus and data collection continued until thematic saturation was reached.

Results: Care partner participants' mean age was 56.7 years, 80% were female, and 24% identified as African American. Older adult ED patients resided primarily in the community (52%) and an almost even split was achieved among those with formal electronic health record documentation of dementia or cognitive impairment and those with newly identified MCI. We identified four major barriers regarding ED care transitions among care partners of PLWD and older adults with MCI: 1) unique care considerations while in the ED setting impact success of the care transition, 2) poor communication and lack of care partner engagement during the ED discharge process, 3) challenges experienced during the acute illness and recovery phases, and 4) difficulty navigating the health care system after an ED encounter.

Conclusion: Our findings demonstrate critical barriers faced during ED care transitions among care partners of PLWD and those with MCI. Findings from this work may inform the development of ED care transition interventions targeting care partners.

No, authors do not have interests to disclose

264 Did COVID-19 Mitigation Affect the Accessibility and Usage of Emergency Department-Based Programs to Combat Opioid Use Disorder?

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Study Objectives: Opioid overdose (OD) is a leading cause of accidental death in the US. To combat the epidemic, emergency departments (EDs) have implemented several ED-based programs to immediately treat this high-risk population, including medications for opioid use disorder (MOUD), take-home naloxone kits, and ED-based peer supporters providing linkage to treatment. Early during the COVID-19 pandemic, many nonemergent hospital resources became unavailable. We have previously shown that while ED volumes decreased, the number of patients with OUD was not decreased in the same proportion. However, the effect of the pandemic on availability and utilization of ED-based resources for patients at high risk for opioid OD is poorly understood. The purpose of this study was to determine the effect of the early COVID-19 pandemic on the utilization of ED-based programs and resources for patients with opioid use disorder.

Methods: This was a retrospective IRB approved analysis of patients with high-risk for opioid OD presenting to a large urban Midwestern ED. Patients were considered high-risk for a subsequent opioid OD by using a predefined algorithm using the electronic health record (EHR, Epic systems). ED utilization of MAT, outpatient naloxone kits, access to ED-based peer support, and direct transport to a treatment facility during the early COVID-19 pandemic (COVID, March 1, 2020 to December 30th, 2020) was compared to the previous year (PreCOVID, March 1, 2019 to December 30, 2020). Statistical comparison was by Fisher's exact test.

Results: There were 363 ED visits during the early COVID timeframe and 544 patients in the PreCOVID timeframe that were considered high risk for subsequent opioid OD. During the COVID timeframe there was an increase in the rate of use of ED-based outpatient suboxone treatment (26% for COVID vs. 12% for PreCOVID, $p<0.001$), increase in naloxone kits given (23% vs. 15%, $p=0.0084$), and an increase in patients directly transported to a treatment facility by ED-peer supporters (17% for COVID vs. 9% for PreCOVID). There was an associated decrease in 90-day subsequent OD (2.5% for COVID vs. 5.9% for PreCOVID, $p=0.015$)

Conclusion: The COVID-19 pandemic did not lead to a decrease in utilization of ED-based programs for the treatment of OUD to prevent subsequent ODs in this health care system. Patients presenting to the ED who were at high risk for an opioid OD able to access and utilized resources at an increased rate, which was associated with a decrease in 90-day opioid OD.

No, authors do not have interests to disclose

265 Sinus Tachycardia Is Rare Among Hemodynamically Stable Patients With Occlusion Myocardial Infarction

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Study Objectives: Among hemodynamically stable patients with chest pain, sinus tachycardia has been suggested as a feature that decreases the likelihood of type 1 myocardial infarction. The purpose of our study was to determine the prevalence of unexplained tachycardia among a cohort of patients with high risk for acute coronary syndrome (ACS) in the emergency department.

Methods: We performed a secondary, retrospective analysis of a prospectively collected database of patients who were high-risk for ACS. The presence of occlusion myocardial infarction (OMI) was defined as a culprit lesion at the time of cardiac catheterization with TIMI-0 to 2 flow or TIMI-3 flow plus peak troponin T >1.0 ng/mL or troponin I >10 ng/mL. Patients were excluded if they had fever (temperature >38°C), hypotension (systolic blood pressure <100 mmHg or diastolic <50 mmHg), cardiac arrest, hypoxemia (SpO2 <90%), tachypnea (RR >29) on initial ED vitals, need for positive pressure ventilation (intubation or non-invasive ventilation), ejection fraction <50%, non-sinus tachydysrhythmia, or subendocardial ischemia pattern on ECG (ST depression maximal in V5-6 and II, with reciprocal ST elevation in aVR).

Among the remaining patients (considered "stable"), we examined the prevalence of heart rates (HR) above 100, 110, and 120 bpm in patients with OMI.

Results: Among all 808 patients, 265 (32.8%) were diagnosed with OMI. 156 of 808 (19.3%) total patients had HR >99, including 57 of 265 (21.5%) with OMI. After the above exclusions for instability, 7 of 265 (2.6%) patients with OMI had sinus tachycardia >99 bpm, 2 of 265 (0.8%) with OMI had HR >109 bpm, and 0 of 265 (0%) with OMI had HR >119 bpm. Sensitivity of HR <100 for the detection of OMI was 97.4%, and the negative likelihood ratio [LR(-)] was 0.312. Raising the HR threshold to 110 bpm yielded LR(-) of 0.042. A chi-squared test demonstrated significantly fewer tachycardic patients in the stable OMI group than expected based on heart rate distributions of those without OMI, $p < .05$.

Conclusion: Our findings suggest that tachycardia is rare among hemodynamically stable patients with OMI. When considering OMI as the cause of a stable patient's symptoms and ECG findings, unexplained sinus tachycardia may decrease the likelihood of OMI and prompt evaluation for other causes of tachycardia.

HR range	OMI (number, % of total)	No OMI (number, % of total)	X^2, *p*-value
<100 or unstable*	258 (97.4%)	497 (91.5%)	
100+	7 (2.6%)	46 (8.5%)	11, $p = .0008$
110+	2 (0.75%)	23 (4.2%)	7.7, $p = .0056$
120+	0 (0%)	9 (1.7%)	4.1, $p = .044$
Total	265	543	

Table 1: Distributions of heart rate within OMI and no OMI populations. X^2 performed with df=1, N=265.
*Hemodynamically unstable = Presence of fever, hypotension, cardiac arrest, hypoxemia, tachypnea, positive pressure ventilation, EF <50%, tachydysrhythmia, or electrocardiographic evidence of subendocardial ischemia

No, authors do not have interests to disclose

266 The Importance of Opioid and Naloxone Education in the Emergency Department for High-Risk Age Groups

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Background: Throughout the United States, opioid abuse continues to be a major public health concern that many emergency departments (EDs) and communities face. New data shows that nearly 75,673 people died from opioid overdose over 12 months ending April 2021. This is up from 56,064 in the previous 12 months. Opioid treatment and education programs have shown effectiveness, especially in areas of high incidence. We hypostasize that specific demographic age groups are at higher risk of opioid abuse and could benefit from an ED opioid education and naloxone distribution program.

Methods: We evaluated a convenience sample of 800 patients at the University of Utah ED located in Salt Lake City, Utah. Data collected included baseline demographic information: age, race, ethnicity, education level, marital status, income, and employment. We also obtained an opioid risk score using a validated opioid risk tool along with 8 survey questions to help determine the feasibility of an ED opioid education and naloxone program. We then completed a 30-day follow-up telephone and chart review. As part of the opioid risk score, 10 questions were asked to each patient to determine the patient's risk for opioid abuse. Each patient was given a risk score with a maximum value of 26. A score of 3 or lower indicated a low risk for future opioid abuse, a score of 4-7 indicated a moderate risk for opioid abuse, and a score of 8 or higher indicated a high risk of opioid abuse. A brief training about naloxone and how to administer or use it was offered to each patient that participated.

Results: Over the 9-month study period, 800 patients were consented to participate by trained research associates. 275 patients scored in the high-risk group of the opioid risk score, 168 scored in the moderate risk group, and 352 scored in the low-risk group. There were a total of 202 patients aged 18-30, 236 patients aged 31-45, 251 patients aged 46-64, and 111 patients who were aged 65+. Patients who were aged 31-45 were at a significantly greater risk of scoring in the high-risk opioid abuse group when compared to the other groups ($p < 0.001$). Those who were aged 31-45 were also at greater risk of having a family member or close friend die of an overdose. ($p=0.002$). The majority of patients who were aged 31-45 were interested in receiving a take- home naloxone kit along with education on how to use it n=156 (66%). At the 30-day follow-up there were several patients who indicated that a take-home naloxone kit could have been useful in the last 30 days (n=9).

Conclusion: A large percentage of our patients who came to the ED were screened as moderate or high risk for opioid abuse. Those patients who presented to the ED aged 31-45 were at significantly greater risk of having a family member die of an overdose and were also more likely to score in the high-risk group for opioid abuse. Many patients presented in the 31-45 age group and were interested in receiving a naloxone kit along with education on how to use it. Surprisingly, some patients indicated a naloxone kit could have been useful within the 30 days of their initial ED visit. An ED could prove to be a valuable place to implement opioid and naloxone education, especially for patients at a high-risk age.

No, authors do not have interests to disclose

267 Throwing the Baby Out With the Ice Water? Dramatic Decreases in Targeted Temperature Management for Out-of-Hospital Cardiac Arrest

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Introduction: Targeted temperature management (TTM) has been a source of debate and controversy in emergency medicine for two decades. Initial trials showed improved neurologic outcomes with aggressive cooling to 32-34o C However, later trials demonstrated that aggressive cooling either did not show benefit, or most recently, is not superior to maintenance of normothermia. This raises concern that the decline in aggressive post-cardiac arrest TTM may lead to worse neurologic outcomes—not because of a lack of cooling, but due to generally less adequate post-arrest care. We hypothesized that over time, as studies have shown less benefit to aggressive hypothermia, that rates of all TTM have declined. In this study we examined the temporal pattern of TTM in our community from 2010-2021.

Methods: Retrospective review of a prospectively collected Out-of-Hospital Cardiac Arrest (OHCA) Registry to Enhance Survival (CARES) for our community. Data are entered at the time of the cardiac arrest by EMS Providers in an electronic patient care record system linked to the CARES registry. Hospital outcomes/ treatments are entered into the linked data base by hospital personnel. Standardized data elements and dictionary guide data entry. Inclusion criteria: All adult, non-traumatic cardiac arrests captured in our community's CARES registry between 2010-2021. Exclusion criteria: pediatric arrests, traumatic arrests. The primary outcome measure was the proportion of admitted, non-traumatic OHCA patients who underwent TTM. The secondary outcomes include the proportion of admitted, OHCA patients who had an initial shockable rhythm upon EMS arrival, and survival/Utstein survival proportions over time. Descriptive statistics (truncated for this abstract) will be reported as appropriate, and the primary outcome measure is presented with proportions and 95% CI and analyzed using Chi Square for Trends using Prism statistical software.

Results: During the study period, there were 3,748 patients who met inclusion/ exclusion criteria. The mean (SEM) age was 63.8 (0.26) years, 36.9 % were female, 82.2% occurred in a home, and 37.1 % were witnessed. 973 (26%) survived to hospital admission. Of those, 306, 31.4% (95% CI= 28.6, 34.0) underwent TTM. The overall survival/Utstein survival was 8.6%/29.2% respectively. The primary and secondary outcome measures are shown in the Table. The TTM proportion (and 95% CI) for admitted OOCA patients was highest in 2010 (53.1% (41.1, 64.8), and steadily declined to its lowest (16.8% (10.4, 26.1) in 2021.

Limitations: inherent limitations of retrospective data analysis, not randomized, small n for secondary outcomes.

Conclusion: In our community, TTM use in OHCA patients has decreased significantly over the past decade; however, our results data did not demonstrate a measurable, statistically significant decrease in either overall or Utstein survival. Our results may have implications for other communities striving to improve OHCA survival rates.

Table

	N	% TTM	95 % CI	N	Survival (%)	95% CI	N	Utstein Survival (%)	95% CI
2010	34	53.1	(41.1, 64.8)	30	11.6	(8.2, 16.2)	18	39.1	(26.4, 53.6)
2011	29	48.3	(36.2, 60.7)	24	9.2	(6.2, 15.0)	11	28.9	(16.9, 44.9)
2012	31	52	(50.5, 70.9)	28.0	8.9	(6.2, 12.6)	15	28.8	(18.3, 42.4)
2013	33	47.8	(36.5, 59.4)	30.0	10.6	(7.5, 14.7)	13.0	34.2	(21.2, 50.2)
2014	15	22.1	(13.7, 33.4)	22.0	7.5	(5.0, 11.2)	7	21.9	(10.7, 39.0)
2015	13	17.6	(10.4, 27.9)	27.0	9.2	(6.4, 12.5)	1.0	28.5	(16.2, 45.2)
2016	13	19.4	(11.6, 30.6)	19.0	5.9	(3.8, 9.1)	11.0	23.4	(13.4, 37.4)
2017	18	22.8	(14.8, 33.3)	17.0	5.7	(3.5, 8.3)	6.0	15.8	(7.1, 30.8)
2018	20	22.4	(14.9, 32.3)	24.0	7.4	(5.0, 10.9)	10.0	32.2	(18.4, 50.0)
2019	22	21.6	(14.6, 30.6)	24.0	6.6	(4.4, 9.6)	13.0	35.1	(21.2, 51.3)
2020	42	33.1	(25.5, 41.7)	35.0	9.2	(6.6, 12.5)	16.0	34.0	(22.1, 48.4)
2021	15	16.8	(10.4, 26.1)	15.0	16.8	(10.4, 26.1)	7.0	25.0	(12.4, 43.6)
Overall	306	41.4	(28.6, 34.0)	322	10.5	(9.4, 11.6)	137	29.2	(25.3, 33.5)

1º Outcome: Proportion of Admitted OHCA patients who underwent Targted Temperature Management (TTM) 2010-2021. Chi Square for Trend = 49.98; p <0.0001. *Secondary outcomes Survival and Utstein Survival proportions and 95% CI. CARES Registry XXXX.*

Yes, authors have interests to disclose
Disclosure: Cardiac Arrest Registry to Enhance Survival (CARES) National Oversight Board
Board Member/Officer/Trustee
Cardiac Arrest Registry to Enhance Survival (CARES) National Oversight Board

268 Axillary Use of Three Junctional Tourniquet Devices in Human Volunteers

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Study Objectives: Hemorrhage is a leading cause of death both on the battlefield and in the out-of-hospital environment. Junctional wounds are difficult to control, and current management strategies include the application of junctional torniquets, of which there are currently three and approved by the FDA: Combat Ready Clamp [CRoC], Abdominal Aortic and Junctional Tourniquet [AAJT], and SAM Junctional Tourniquet [SJT]). Previous studies established lower extremity effectiveness both in volunteer subjects and cadaver models. This study examined upper extremity application and effectiveness both at baseline and during transport.

Methods: This was a randomized, cross-over design where the subject served as their own control. The investigator located the radial pulse of subjects via Doppler ultrasound prior to study conduction. Participants were timed on their application of each of three junctional tourniquets to the axilla. The effectiveness of each tourniquet was assessed by Doppler ultrasound at the radial artery. The investigator continuously monitored the pulse from the start of tourniquet application until one of the three endpoints: absence of pulse, inability of the subject to tolerate the procedure, or 5 minutes (300 seconds) of compression produced by tourniquet application as measured by a separate stopwatch. If the radial pulse was absent on Doppler ultrasound, the subject was quickly transferred to a tactical litter, and the pulse was assessed again.

Results: Twenty-six subjects were enrolled in this study. Initial failure rates to obtain pulselessness in the radial artery were high, with 16 of 26 (62%) CRoC evolutions having failed, 21 of 26 (81%) SJT having failed, and 17 of 26 AAJT (65%) having failed. Failure rates after transfer to a litter included: 100% (9/9) failure with CRoC subjects; 75% (3/4) failure with SJT subjects; 71% (5/7) failure with AAJT subjects.

Conclusion: Each of the three junctional tourniquets on the market today showed high initial placement failure rates in this investigation. There were also high failure rates with each tourniquet when the subject was transferred to a litter, consistent with previous studies. This study highlights the continued difficulty in controlling junctional wounds, especially in the upper extremities. Newer methods may need to be designed or limitations of the tourniquets, particularly during transport, must be realized.

No, authors do not have interests to disclose

269 Social Vulnerability Index Predicts Reduced Patient Portal Engagement During Emergency Department Visits

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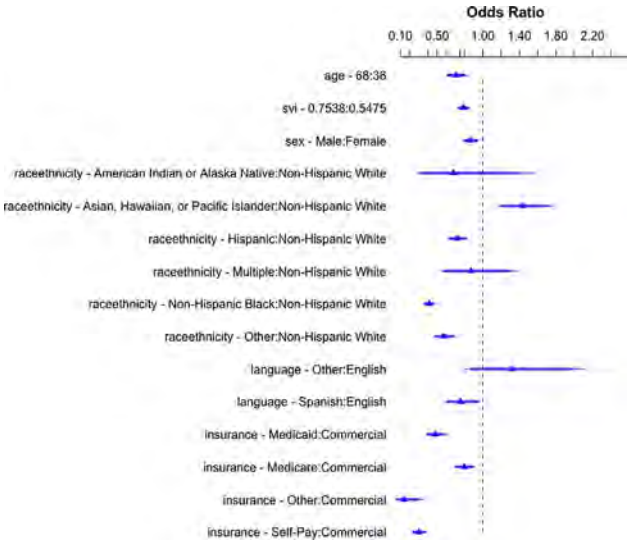
Study Objectives: We previously showed that patients use the MyChart patient portal to view test results in the ED. The Center for Disease Control and Prevention's (CDC) Social Vulnerability Index (SVI) combines geographic socioeconomic, household composition & disability, minority status & language, and housing type & transportation data into a single score. We hypothesized that SVI scores would predict disparities in MyChart use while in the ED.

Methods: This observational, retrospective study at an academic urban ED in North Texas evaluated whether SVI was associated with ED MyChart use. We included adult patients presented between 4/5/2021 and 4/4/2022. Patients were in the viewed group if they viewed ≥ 1 result in the ED. Home zip code and state linked patients to SVI percentile scores (from 0-1, 1 represnts highest vulnerability) using publicly available data from the CDC (v 2018). SVI values were missing in 16% of cases, prompting random forest imputation using the missRanger R package. Binary logistic regression evaluated active MyChart use as a function of SVI. To address confounding, we included the following covariates: age, combined race/ethnicity, insurance, sex, and language. SVI and age were represented as 5-knot restricted cubic splines for nonlinear responses. We used Huber-White covariance analysis with clustering to account for potential dependence between encounters from the same patient. This study was deemed exempt by our institutional review board. We used R version 4.1.2. $\alpha = 0.05$ for significance.

Results: During the study period, there were 60,332 patients, of whom 7,362 (12.2%) used the portal during their stay. Comparing patients who viewed results in the portal to those who did not view results, median SVI were 0.707 [Interquartile range (IQR) 0.392 - 0.754] and 0.754 [IQR 0.548 - 0.754], respectively. Median ages were 52.0 [IQR 36 - 67] and 54 [36 - 68], respectively. In the viewed group, 60% of patients were women compared to 57.3%. The viewed group was 56.2% (vs. 40.9%) non-Hispanic White, 17.4% (vs 32.8%) non-Hispanic Black, 15.8% (vs. 18%) Hispanic, and 5.6% (vs. 2.5%) Asian, Hawaiian or Pacific Islander. In the viewed group, Spanish-speakers represented 2.3% (vs 4.0%). In the viewed group, 56.5% (vs 42.8%) were commercially insured, 3.6% (vs 7.1%) had Medicaid, 2.9% (vs 9.0%) were uninsured, and 36.9% (vs 40.6%) had Medicare. The regression model was significant compared to the null model with LR $\chi 2$ test = 2045.90 with 19 d.f. ($p < 0.0001$). The overall model's concordance index was 0.658. Increasing social vulnerability, specifically the non-linear contributions from the SVI spline, were independently associated with not having viewed results in the ED. Both insurance status and race/ethnicity were independent predictors of the same and were stronger contributors to the model than SVI. Odds ratios are shown in Figure 1; for age and SVI represented by non-linear splines, the odds ratios are calculated between the 25th and 75th percentiles.

Conclusion: Increasing social vulnerability is associated with lower likelihood of active results review while in the ED, though race and ethnicity as well as insurance status are even more strongly associated with inequitable use. Age was associated, but less strongly. These factors might help facilitate community-based outreach to facilitate digital literacy training.



No, authors do not have interests to disclose

270 Code De-Escalation: Effectiveness and Feasibility Pilot Study of Intervention to Decrease Restraint Use and Health Inequities in Agitation Management in a Community Hospital Emergency Department

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Study Objectives: Restraint use in the emergency department (ED) has been shown to pose significant physical, psychological, and medicolegal risk to both patients and health care workers. Recent studies have demonstrated racial disparities in restraint application in the ED setting. This study aimed to evaluate the effectiveness of Code De-escalation, a standardized team-based approach for agitation management and assessment of perception of threatening behaviors, in reducing restraint use and racial disparities in restraint application in a community hospital emergency department.

Study Design/Methods: We performed a retrospective observational study of the effect of introduction of the Code De-escalation pathway on violent restraint use among ED patients who had been placed on an involuntary psychiatric hold in a community emergency department. This new pathway includes a built-in step for the team members to systematically assess the perception of threat related to the patient behavior and the threat perceived by the patient. We used a Chi-squared test to compare incidence of restraints per ED encounter during the eight- month period after the intervention (May 2021-Dec 2021) with an eight-month period pre-intervention. We used a Cochran-Mantel- Haenszel test to look for differences in restraint use among racial and ethnic groups. To avoid confounding by the dramatic changes in patient volume and type during the peak of the COVID pandemic, we chose a pre-intervention period that pre-dated this (May 2019-Dec 2019). We compared our results to rates at neighboring community hospitals within the same hospital network during the same period.

Results/Findings: Our sample size included 434 ED encounters pre intervention and 535 ED encounters post intervention. Over the study period, we observed a significant decrease in the violent restraint use among patients on an involuntary psychiatric hold from a rate of 7.4% to 3.7% (p=0.02). This was despite an overall increase in the number of patients requiring an involuntary psychiatric hold over the same period. This decrease was observed across all racial and ethnic groups. The same decrease in violent restraint use was not observed at the two other community hospitals within our hospital network and in the same metro area.

Conclusion: A standardized de-escalation algorithm may be an effective tool in helping EDs decrease their use of restraints and may be one tool to help close the racial gap in restraint use among patients experiencing agitation.

* Note Dana Im and Alice Bukhman contributed equally to conception and writing of this abstract

No, authors do not have interests to disclose

271 Association Between Extreme Crowding and Wellness on Shift in a Pediatric Emergency Department

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Background: Emergency department (ED) health care worker (HCW) wellness is associated with patient quality of care outcomes and patient experience. Numerous factors contribute to HCW wellness in the ED, including systems-based and operational issues. While ED crowding has been previously tied to numerous negative patient outcomes, there is limited research examining the relationship between ED crowding and provider wellness.

Study Objective: The primary objective of this study was to determine the association between ED crowding, measured by the National Emergency Department Overcrowding Score (NEDOCS), and HCW wellness, measured using a novel shift wellness score (SWS).

Study Design/Methods: We performed a retrospective observational study on electronic health record data from Riley Hospital for Children at Indiana University Health ED, a pediatric quaternary care hospital and level 1 trauma center during a 13-month time period from 10/27/2020 to 12/31/2021. We used a previously piloted, novel, Shift Wellness Score (on a 7-point Likert scale and undergoing validation) to examine ED HCW satisfaction with their shift. We performed odds ratio calculations to demonstrate a relationship between HCW SWS and exposure to a NEDOCS score in the "extreme crowding" category (NEDOCS >180). We considered a poor shift wellness score to be 3 or less on the 7-point Likert scale, corresponding to responses of "slightly, moderately, and very dissatisfied with the shift." The SWS were analyzed by roles (faculty physician, fellow, resident, RN, and medic).

Results/Findings: A total of 657 HCW SWS surveys were studied, which were matched by electronic time stamp with NEDOCS score for that date. Of the 657 SWS surveys completed, 28.8% occurred during a period of "extreme crowding" (NEDOCS score >180). The odds ratio for a poor shift wellness rating (score 1-3) was 2.35 (95% CI: 3.43-1.60) for all roles when exposed to extreme crowding (NEDOCS score >180). The odds ratio for a poor SWS (1-3) was 2.34 (95% CI: 1.12-4.86) for physicians (faculty, fellows, and residents) when NEDOCS score >180 during the shift. The odds ratio for a poor SWS (1-3) was 3.22 (95% CI: 1.93-5.36) for nurses and medics when NEDOCS score >180 during the shift.

Conclusion: Exposure to extreme crowding is associated with higher risk of a lower ED HCW satisfaction score on shift. This could have implications for provider burnout, patient quality of care outcomes, patient experience, and initiatives targeting physician wellbeing improvement. Further work is needed to determine factors that could improve ED provider wellness during times of high crowding.

No, authors do not have interests to disclose

272 An Approach to Point-of-Care Ultrasound Training in a Teaching Hospital in the Gambia

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Background: Edward Francis Small Teaching Hospital (EFSTH) is a tertiary referral and teaching hospital in The Gambia. Similar to many hospitals in low and middle income countries, imaging resources are limited. We created a unique point-of-care ultrasound (POCUS) certification course for a broad range of physician specialties at EFSTH. This abstract outlines features of this course and findings from pre/post testing and a post-course survey.

Methods: A five day POCUS course was held in February 2022 at EFSTH. Five attendings and 35 residents from internal medicine, family medicine, general surgery, neurosurgery, obstetrics/gynecology and anesthesia were present. The three instructors from UC Davis had fellowship training in ultrasound and global health and were assisted by an EFSTH radiology attending. Mornings focused on core material including e-FAST, cardio-pulmonary POCUS, ultrasound-guided procedures, and soft-tissue/DVT among other topics. Lectures were presented in case-based format. Afternoons were spent in small group hands-on sessions. Content was built upon each day with reinforcement of key principles for spaced repetition learning. We used modified team-based learning techniques and competition to create an interactive experience. The course integrated real time assessment of learners throughout all educational modalities. Each participant completed a 12-question multiple choice pre- and post-course test as well as an anonymous survey.

Results: The median score on the post test improved from 58% to 92%, showing a 34% absolute difference with a Mood's Median Test value of 29 (p value <0.00001) indicating statistical significance. The post-course survey, on a Likert five-point scale revealed strong agreement with clarity of objectives, engaging instruction, desire that the course be given to all physicians, objectives met and confidence to incorporate POCUS into the trainee's current medical practice. The highest disagreement was with the statement 'there was adequate time for hands-on practice'.

Conclusions: A five day POCUS course in a low resource setting incorporating case-based didactics, team-based learning, and hands-on practice with real-time assessment is feasible and can lead to improvement on a basic knowledge test. Importantly, this course was perceived as valuable by the trainees and the majority of course participants feel they are ready to utilize their skills in their current practice. The second half of the POCUS certification is in progress at the time of this publication and is focused on live patient scanning. After the course, three instructors spent the subsequent three weeks supervising scans throughout the hospital. Trainees are required to complete 50 qualified scans within six months after the course. Each scan will be uploaded to a cloud and reviewed. We plan to hold quarterly virtual feedback sessions. The EFSTH radiology attending and a visiting POCUS-trained ICU physician will supervise and review in-person scans as well. We plan to continue this partnership with annual courses and longitudinal assessments. The long-term goal is to have POCUS training integrated into the core residency curriculum led by local instructors. Potential challenges include limited financial resources to purchase and maintain equipment, sharing

machines between departments and constrained availability of in-person scanning supervision, but solutions are actively being developed.

No, authors do not have interests to disclose

273 Use of an Electronic Medical Record Flag to Reconnect with Patients Lost to Follow-Up in a Hepatitis C Virus Screening Program

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Study Objectives: A significant challenge of implementing robust, public health screening programs in the emergency department (ED) is ensuring linkage of care for patients who screen positive. Our primary objective was to implement an automated electronic medical record (EMR) flag to increase linkage to care (LTC) for patients initially deemed to be lost to follow-up (LTF) during routine Hepatitis C virus (HCV) screening.

Study Design/Methods: As part of a clinical quality improvement project within a large, urban ED, we routinely screen patients for HCV using an automated, opt-out process. The HCV screening process generates a weekly report of test results. Thereafter, a project coordinator contacts patients with positive results to link them to care. When 3 attempts at contacting the patient fail, the patient is deemed LTF. To close a substantial gap in reaching patients who screen positive, we initiated an EMR flag for each patient deemed LTF. This flag was placed in each patient's chart to trigger a real-time electronic page to an EMR in basket shared by the study team whenever the patient registered to be seen in our ED. When available, a member of the study team would approach the patient to reconnect, discuss test results and offer to coordinate linkage to care. For this study, we evaluated patients screened in the ED for HCV between August 1, 2018, and March 31, 2022, that were deemed LTF. Analysis consisted of evaluating program metrics from initiation of the EMR flag on March 11th, 2021, through May 18th, 2022.

Results/Findings: There were 751 patients deemed LTF and each received an EMR flag. Following the implementation of the flag system, 199 (26.5%) patients registered to be seen in our ED and 63 (31.7%) were approached for linkage to care. Of these 63 patients, 30 (47.6%) were linked to care and attended their first hepatology appointment, 13 (20.6%) were agreeable to a hepatology referral but had yet to attend their appointment, 11 (17.5%) were medically unstable, 6 (9.5%) had positive HCV antibody tests and needed HCV RNA testing which was subsequently negative requiring no further treatment, and 3 (4.8%) declined care. The remaining 136 (68.3%) were not approached due to unavailability of study team staff.

Conclusion: Creation of an EMR flag is a valid additional resource for ED-based public health screening programs to increase patient linkage to care. When tested in the ED, it yielded positive results in terms of reconnecting with patients who were previously deemed LTF. Additional resources dedicated to tracking patients with an EMR flag could be a cost-effective addition to a screening program.

No, authors do not have interests to disclose

EMF 274 Acceptability of Video-Based Firearm Safety Education in the Pediatric Emergency Department

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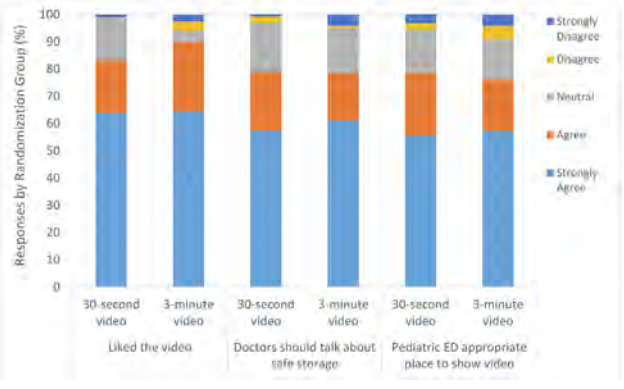
Study Objectives: Firearm (FA)-related injuries are a leading cause of death among U.S. youth. Storing FAs locked, unloaded and ammunition locked separately is protective against unintentional and self-inflicted injuries. There is little research on FA safety education for caregivers in pediatric emergency departments (PEDs). Our objective was to compare, in a PED, acceptability of a 3-minute vs 30-second video promoting safe FA storage in homes with children.

Methods: We conducted a randomized control trial in a large PED (March-September 2021). Eligible participants were English-speaking caregivers of any patient not critically ill. Participants were surveyed about child safety behaviors (including FA storage) and assigned to watch a 3-minute or 30-second FA safety video. Both described safe storage principles; the longer also included temporary FA removal and a survivor testimonial. The primary outcome was acceptability, measured by responses to "The pediatric emergency department was an appropriate place to show this video", on an after-video survey. Likert responses of "agree" or "strongly agree" on a 5-point scale were collapsed and compared vs grouped other responses using chi-square differences by subgroup.

Results: Of 250 participants, 32.4% had household FAs. Nearly all (99.6%) thought video recommendations were clear and 86.6% liked the videos, with no difference by video length or household FA ownership. Most (77.4%) agreed/strongly agreed that the PED was an appropriate place to show the video; this was higher in non-FA owners (85.2%) compared to FA-owners watching the 30-second video (62.2%; p=0.004). Most 78.6% felt doctors should talk about FA storage, with no difference by household FA ownership. More caregivers viewing the longer video felt the length appropriate (99.2%) compared to those viewing the shorter video (81.1%, p<.001); more in the 3-minute group reported plans to ask about FAs for their child's playdates (87.0% vs 68.0%; p 0.001).

Conclusion: This study shows that video-based FA safety education is acceptable in the PED regardless of household FA ownership. Though both videos were acceptable, more thought the 3-minute was an appropriate length, and the longer video was associated with greater reported intention to assess FA access in the homes where their children play. Video-based safety education can be used to provide consistent and broad education to parents in PEDs and would benefit from study in general EDs and other regions of the country.

Figure 1: Participant perceptions of viewing short versus long educational video in the Pediatric Emergency Department



No, authors do not have interests to disclose

275 Prothrombin Complex Concentrate Use in a Rural Health Care Network

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Study Objectives: Reversal of warfarin-induced anticoagulation using prothrombin complex concentrate (PCC4) is more rapidly achieved than with traditional methods such as fresh frozen plasma (FFP). In many rural facilities the availability of PCC4 has been limited. A tertiary hospital instituted a program to provide PCC4 to rural sites using an air transport team and pharmacy exchange. We hypothesized that increasing accessibility of PCC4 would shorten time to INR reversal.

Methods: This was a retrospective study with the primary outcome being time to INR reversal (INR $\leq$ 1.6) from outside hospital admission. Active warfarin prescription, EMS transfer to the tertiary facility, and receipt of anticoagulation reversal between January 2012 and December 2020 were required for inclusion. Patients were grouped by dates before and after implementation of the program in August 2016. Time to event analysis was conducted to compare mean INR reversal times. Propensity score matching was used to match patients in each arm and Chi-square analysis compared variables across groups.

Results: After data collection and review, 165 patients were analyzed. There were 44 patients transferred before implementation of the PCC4 exchange program and 121 after. The mean duration to INR reversal was significantly shorter for patients post-exchange (19.03 hours) compared to pre-exchange (38.98 hours) (p=0.0104). There was no significant difference in 30-day mortality between the groups.

Conclusion: In rural hospitals, increasing availability of PCC4 using a medication exchange program significantly reduces time to INR reversal in warfarin patients.

No, authors do not have interests to disclose

276 Relationship Between Fluid Administration in the First Three Hours of Sepsis Resuscitation and Mortality

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Study Objectives: Timely and effective fluid resuscitation is vital for stabilizing sepsis while avoiding volume overload. Therefore, our study assessed the impact of administering a 30 mL/kg bolus fluid to patients with sepsis within 3 h of clinical outcomes.

Methods: This research was a multicenter observational study conducted at 17 intensive care units (ICUs) of tertiary hospitals in Japan. All adult patients diagnosed with sepsis following the sepsis-3 criteria were included, after which they were admitted to ICUs from July 2019 to August 2020. Next, the clinical outcomes of patients with sepsis administered a 30 mL/kg bolus fluid within 3 h of sepsis recognition were compared to those who were not. The primary outcome was mortality within 28 days. Subsequently, the impact of administering a 30 mL/kg bolus fluid within 3 h on risk-adjusted 28-day mortality rate was estimated using logistic regression analysis, adjusted by inverse probability of treatment weighting analysis with propensity scoring. In addition, propensity score matching (average treatment effects) was used to compare them. Finally, patient's age, sex, admission source (emergency department, ward, or in ICU), the Charlson comorbidity index, mechanical ventilation use, and each organ score within the sequential organ failure assessment score (SOFA score) were adjusted. The study protocol was reviewed and approved by the ethics committee of all participating institutions in the Japanese Association for Acute Medicine (JAAM) study group.

Results: Among the 172 understudied patients, while 74 (43.0%) received 30 mL/kg of fluid within 3 h (30 $\times$ 3 group), the other 98 (57.0%) received less than 30 mL/kg of fluid within the same period (non-30 $\times$ 3 group). Notably, obese patients (BMI $\geq$ 25) were less likely to receive 30 mL/kg fluid than normally weighted patients ($P = 0.04$). Results also showed that although the median SOFA score was 9 (Q1–Q3: 7–11) in the 30 $\times$ 3 group, it was 7 (Q1–Q3: 4–9) in the non-30 $\times$ 3 group. Moreover, patients who experienced shock in the 30 $\times$ 3 group (75.7%) exceeded those who did not experience this symptom (38.8%) ($P < 0.01$). Moreover, it was observed that the median total fluid amount after 6 h for patients in the 30 $\times$ 3 group was 3675 (Q1–Q3: 2740–5700 mL) and 1380 (Q1–Q3: 720–2100 mL) ($P < 0.01$) in the non-30 $\times$ 3 group. Nonetheless, among the patients who showed vasopressor indications (n = 92), 40/53 (75.5%) received vasopressor initiation within one hour in the 30 $\times$ 3 group and 22/39 (56.4%) in the non-30 $\times$ 3 group ($P = 0.05$). However, the 28- day mortality rate was 29.7% in the 30 $\times$ 3 group and 12.2% in the non-30 $\times$ 3 group ($P < 0.01$). Alternatively, although the in-hospital mortality rate was 36.5% in the 30 $\times$ 3 group and 14.3% in the non-30 $\times$ 3 group ($P< 0.01$), the adjusted odds ratio for the 28-day mortality rate of the 30 $\times$ 3 group, compared with the non-30 $\times$ 3 group was 2.17 (95% CI: 0.85–5.54). Nevertheless, the 28-day mortality rate in the 30 $\times$ 3 (n = 70) and non-30 $\times$ 3 (n = 95) groups were 30% each among matching patients.

Conclusion: Patients with sepsis who received the 30 mL/kg bolus fluid within 3 h experienced more severe clinical outcomes. However, these outcomes were unassociated with the increased odds of the 28-day mortality rate. Therefore, suggestively, timely and adequate fluid resuscitation can improve survival.

No, authors do not have interests to disclose

277 Agents of Exposure Among Pediatric Transgender Patients: An Analysis of the Toxicology Investigator's Consortium (ToxIC) Registry

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Background: Little is known regarding trends in poisonings within the pediatric transgender population. The purpose of this study was to review medical encounters managed by bedside medical toxicologists, and to describe trends within the data regarding types of exposures in this specific population.

Methods: The Toxicology Investigators Consortium (ToxIC) database was created in 2010 by the American College of Medical Toxicology (ACMT) to compile data recorded by medical toxicologists in both inpatient and outpatient settings. In January 2017 the data field for transgender (male-to-female, female-to-male, or gender non-conforming) was added to the ToxIC form. A retrospective database review of these transgender patient cases dating between January 2017 and December 2020 was performed.

Results: There were 195 transgender patients included in the ToxIC registry between January 2017 and December 2020. Of those, 103 (52.8%) were pediatric patients (age <18 years), 97 (49.7%) of whom were between the ages of 13-18, and six between (3.1%) ages 7-12. We focused on the 97 teenagers for the data analysis. Of the 97 teenagers, 71 (73.2%) were female-to-male, 18 (18.6%) were male-to-female, and eight (8.2%) were gender non-conforming. With regard to reason for the encounter, 91 (93.8%) of the teenagers were evaluated for an intentional pharmaceutical ingestion, compared to 73 of 92 (79.3%) of adults reporting an intentional pharmaceutical ingestion. Four teenagers (4.1%) reported an intentional non-pharmaceutical ingestion—one for alcohol use, and one for an unintentional pharmaceutical ingestion. Of the 91 teenagers that reported an intentional pharmaceutical ingestion, the primary agent in 24 (26.4%) cases was antidepressants, 21 (23.1%) analgesics, 11 (12.1%) anticholinergic/antihistamines, six (6.6%) anticonvulsants, six (6.6%) cardiovascular medications, five (5.5%) antipsychotics, three (3.3%) sympathomimetics, two (2.2%) cough and cold medications, two (2.2%) opioids, and two (2.2%) unknown pharmaceuticals. Each of the remaining 9 patients were exposed to one of the following categories as their primary agent: anticoagulants, antimicrobials, caustics, GI medications, herbal/dietary supplements/vitamins, lithium, metals, sedative-hypnotic/muscle-relaxants, and other pharmaceuticals. The most common vital sign abnormality in the cohort was tachycardia (HR>140), observed in 17.5% (N=17) of the teenagers. This compares to the 13.0% (N=12) of the 92 transgender adults with tachycardia in the cohort. Nervous system abnormalities were seen commonly both in teens, 74.2% (N=72) and adults, 67.4% (N=62). The most common nervous system abnormality was coma/CNS depression. Of the 97 exposed teenagers, 25.8% (N=25) experienced these symptoms, and of the 92 exposed adults, it was reported in 23.9% (N=22). There were no deaths in either the teenage or adult transgender groups.

Conclusion: The majority of transgender exposures in the ToxIC registry were teenagers ranging in age from 13-18 and the most common reason for encounter was an intentional pharmaceutical exposure. The percentage of teens seen for this reason was higher than the adult transgender population during the same time frame. The most common substances ingested were antidepressants and analgesics. Recognizing and promoting further research on these trends could be helpful in both preventing and treating intentional poisonings within the transgender teenager population.

No, authors do not have interests to disclose

278 Dissemination of Information about Ivermectin on Twitter During the COVID-19 Public Health Emergency

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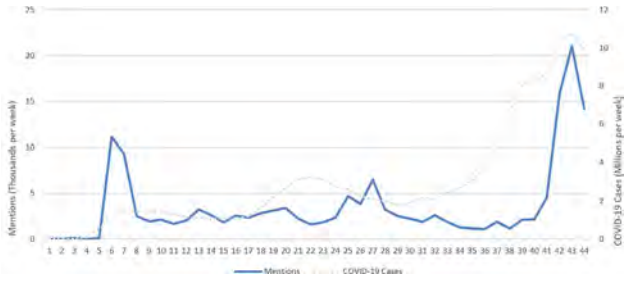
Study Objectives: During a public health emergency such as the COVID-19 pandemic, emergency physicians may use Twitter to learn about innovations in care. However, knowledge is limited about how information on innovations spreads on Twitter and what the implications are for quality. Studying the spread of information about ivermectin, a medication not recommended to prevent or treat COVID-19, may yield insights into how communication can be improved in the future. Our objective was to describe the dissemination of information about ivermectin during the pandemic through analysis of mentions on Twitter.

Methods: We collected Twitter posts and related metadata using Brandwatch, a leading platform for aggregating and analyzing social media data. Posts were included in our sample if they: 1) occurred between March and December 2020; 2) included the word "ivermectin"; and 3) were written in English. We collected text from posts; metadata describing post date, author location, and profession; and social media network data on user interactions. To analyze the data, we used embedded capabilities in Brandwatch (eg, graphing of mentions of ivermectin over time). We paired data on ivermectin mentions with COVID-19 case counts from the New York Times to improve contextual understanding. Finally, we used RAND-Lex, a suite of text analytics and machine learning tools at RAND, to perform social media network and corpus analyses for identifying: communities of users discussing ivermectin; and non-ivermectin topics and hashtags trending within communities.

Results: We identified 165,159 posts meeting eligibility criteria from 68,497 unique users. Authors of tweets were most commonly located in the United States, India, the United Kingdom, and Canada. Professions of tweet authors were most commonly categorized as health practitioner, scientist/researcher, and executive. The number of ivermectin mentions spiked in March (week 6; max 11,097 posts/day), August (week 27; max 6,486 posts/day), and December of 2020 (week 43; max 21,024 posts/day). [See Figure for a graph of ivermectin mentions per week, which is paired with US national COVID-19 case counts for contextual understanding.] Common trending topics among users in the sample included "Pierre Kory", "early treatment", and "brave and keep fighting against COVID19". We identified 3 large-scale communication communities: A) users interacting with the "COVID-19 Critical Care Alliance" (a non-profit led by Dr. Pierre Kory), who commonly tagged posts with #followthescience, #vitamind, and #realnews; B) users opposed to police enforcement of lockdowns for COVID-19 in India, who commonly tagged #justiceforjayarajandfenix, #idtwitter, and #beatntds (ntds = neglected tropical diseases); and C) users proponing hydroxychloroquine and opposing Dr. Anthony Fauci, who commonly tagged #fraudulentfauci, #newsmax, and #hcqworks.

Conclusion: During 2020, ivermectin was mentioned as many as 11,097 times per day on Twitter. We identified 3 large- scale communication communities who also discussed other hot topics related to health care and popular news, such as emerging treatments, fairness of lockdowns, and veracity of the news. Our findings underscore the importance of tailoring dissemination strategies during a public health emergency so that important consumers of information, such as frontline emergency physicians, can learn about key innovations and ascertain the quality of evidence that supports or refutes their use.



No, authors do not have interests to disclose

279 Change in Emergency Department Telehealth Use for Various Specialties Since the Onset of COVID-19

Boggs K, Freeman R, Zachrison K, Samuels-Kalow M, Gao J, Lu L, Sullivan A, Camargo C/Massachusetts General Hospital, Boston, Massachusetts, US

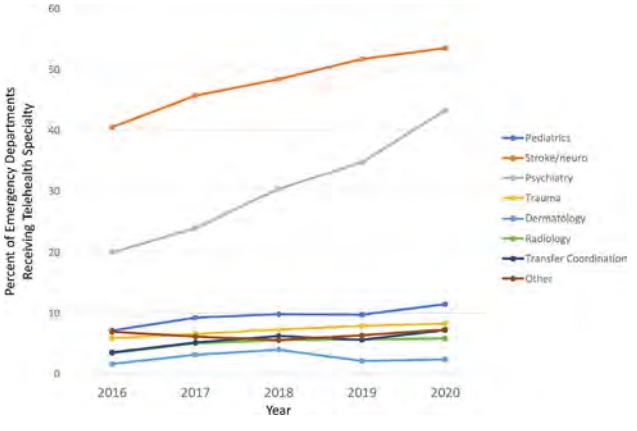
Study Objectives: Since the onset of the COVID-19 pandemic, many U.S. emergency departments (EDs) began using telehealth services to access consulting specialists for patient evaluation. However, little is known about the increase in ED telehealth use for various specialties over the past several years. We aimed to characterize U.S. EDs' use of telehealth by specialty from 2016-2020, and to determine whether use by specialty in 2020 was significantly increased from 2019.

Methods: The National ED Inventory (NEDI)-USA surveys characterized all U.S. hospital-based and freestanding EDs open from 2016-2020. Each year, we assessed telehealth use by asking whether each ED received telehealth services from another facility or outside organization. Among those reporting telehealth receipt, we asked them to report the specialties for which they used telehealth from this list: pediatrics, stroke/neurology, psychiatry, trauma, dermatology, radiology, transfer coordination, disaster preparedness (only included in the 2019 and 2020 surveys), and COVID-19 (only included in the 2020 survey). EDs could report telehealth receipt for other specialties in a free text space. Descriptive results are reported as frequencies and proportions. Statistical analyses included McNemar tests to identify increases in receipt of ED telehealth by specialty, among EDs that participated in both the 2019 and 2020 surveys.

Results: Between 5,453 and 5,598 U.S. EDs were open each year from 2016-2020, and between 82% and 86% of U.S. EDs responded to each of the 2016-2020 NEDI-USA surveys. Telehealth receipt overall increased from 2,358 of 4,511 (52%) responding EDs in 2016 to 3,108 of 4,586 (68%) responding EDs in 2020. The proportion of EDs reporting receipt of telehealth for each specialty type assessed from 2016-2020 is shown in Figure 1. In 2020, EDs most frequently received telehealth for stroke/neurology (54%) and psychiatry (43%). Eleven percent received telehealth services for pediatrics, and 9% received telehealth services to assist with COVID-19 care.

Among the 4,068 (74%) EDs that responded to both the 2019 and 2020 NEDI-USA surveys we investigated change in telehealth receipt by specialty at the start of the pandemic. Between 2019 and 2020, the greatest increases in telehealth receipt by specialty were psychiatry (34% of EDs in 2019 vs 44% in 2020), stroke/neurology (51% vs 54%), pediatrics (10% vs 12%), and transfer coordination (5% vs 6%, all $P<0.001$). There was a <1% increase in receipt of telehealth for all other specialties; telehealth receipt did not decrease for any specialty.

Conclusion: In 2020, U.S. EDs most frequently received telehealth for stroke/neurology. Between 2019 and 2020, the greatest increase in ED telehealth receipt was for psychiatry. We encourage additional work to evaluate the quality of specialty care delivery via telehealth and how increasing use of telehealth has helped to address disparities in access to specialty care.



No, authors do not have interests to disclose

280 Emergency Department Predictors of Mortality for Adult Patients With Severe Coronavirus Disease-19 (COVID-19) in a Tertiary Hospital: A Retrospective Cohort Study

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Introduction: The data regarding the predictors of mortality in Coronavirus disease-19 (COVID-19) patients remains limited since the disease entity is very novel. Determining the factors affecting the mortality of these patients are needed in the development of guidelines and other significant health policies concerning triaging and patient management. This study aims to determine the variables affecting the mortality of severe and critical COVID-19 patients based on their initial presentation and work-up in the emergency department (ED).

Methods: A single-center, retrospective cohort study involving adult patients diagnosed with COVID-19 with severe or critical features was done. A descriptive study was performed from data collected, and a univariate and multivariate study was performed to determine significant variables predictive of mortality.

Results: A total of 3,706 adult COVID-19 confirmed patients were seen in the ED from March to December 2020. The median age was 65.81 (20-94), and 178 (55.11%) were male. A total of 130 (40.25%) patients died on or before the 28th day of admission. According to multivariate regression analysis results, patients with multiple comorbidities (≥ 4) (OR 3.68, 95% CI 1.60 to 8.43, p=0.002), patients who presented with generalized body weakness (OR 3.01, 95% CI 1.45 to 6.24, p=0.003), and tachycardia (OR 2.60, 95% CI 1.35 to 5.02, p=0.004); an increase in level of partial pressure of carbon dioxide in arterial blood (PaCO2) (OR 1.04, 95% CI 1.01 to 1.08, p=0.01), and patients with elevated lactate levels (OR 1.65, 95% 1.24 to 2.19, p=0.001) were found to significantly increase the mortality, while patients with increased lymphocyte count (OR 0.94, 95% CI 0.90 to 0.98, p=0.009); patients with higher partial pressure of oxygen in the arterial blood (PaO2) levels (OR 0.99, 95% CI 0.98 to 1.00, p=0.02); and patients maintained on high- flow nasal cannula (HFNC) (OR 0.17, 95% CI 0.07 to 0.43, p=0.00) or nasal cannula (OR 0.19, 95% 0.09 to 0.422, p=0.00) during the first 24 hours of ED stay will decrease mortality.

Conclusion: Patients with multiple comorbidities, those who present with generalized body weakness and tachycardia, an increasing PaCO2 level, and elevated lactate levels are associated with an increased risk of mortality in patients with severe or critical COVID-19.

Keywords: Mortality; SARS-CoV-2 infection; 2019 novel coronavirus disease; COVID-19 pandemic

No, authors do not have interests to disclose

281 Out-of-Hospital TXA Administration Opportunities in Trauma Patients Transported by ALS Ground EMS - A Descriptive Study

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Introduction: As many as 30% of severely injured trauma patients demonstrate evidence of acute coagulopathy of trauma (ACOT) at the time of ED admission. Early administration of tranexamic acid (TXA) may improve patient outcomes with ACOT. Within our system, TXA is currently available only to helicopter EMS (HEMS) units. The purpose of the current study was to determine whether there was a cohort of trauma patients transported by ground EMS (GEMS) who might benefit from out-of-hospital TXA administration.

Methods: Retrospective chart review of trauma patients transported by Mayo Clinic Ambulance Service (MCAS) to the Mayo Clinic Hospital (MCH), Rochester, Minnesota, between January 1, 2011, and December 31, 2019. Inclusion criteria for the final cohort included GEMS transport, hypotension (SBP $<$ 90 mm Hg) and shock index $>$ 1. Where available, thromboelastogram (TEG) were reviewed for evidence of hyperfibrinolysis.

Results: A total of 10,974 trauma patients were transported during the study period, of which 122 were included in the final study. Eleven (9.2%) were penetrating trauma. 8 patients were anticoagulated (warfarin 6, NOAC 2). Mortality was 15/122 (12.3%). No patient received TXA in the emergency department; 28 received blood products during their resuscitation. Fifty three patients had TEG results; 16 had an LY30 $>$3% (27.12%). When comparing patients with Ly30 $>$ 3% vs. $<$ 3%, no difference was noted in the lowest SBP (p= .16), mechanism of the injury (p= .46), thoracoabdominal trauma (p = .195), ED blood transfusion (p= .46), blood transfusion at any time (p= .91), or mortality (p = 1.0). One patient received TXA in the ICU; that patient had a Ly30 $<$ 3%.

Conclusion: The current data suggest that in our EMS system, routine GEMS TXA availability would appear to be infrequently utilized and not anticipated to alter trauma outcomes significantly. Further study is needed to determine potential benefits in other EMS systems, particularly those with higher proportions of penetrating trauma, non-compressible truncal hemorrhage, or lack of HEMS TXA availability. Criteria for limited ground availability, such as in supervisor response vehicles, should also be evaluated.

No, authors do not have interests to disclose

282 Buprenorphine-Precipitated Opioid Withdrawal in the Emergency Department: A Case Series

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Study Objectives: Buprenorphine is a highly effective medication for the treatment of opioid use disorder (OUD), and recent guidelines from the American College of Emergency Physicians recommend initiation of buprenorphine treatment in the emergency department (ED). A rare, but feared, adverse outcome from administering buprenorphine is precipitated opioid withdrawal (BPOW). Little is known about risk factors, clinical course, and optimal management of BPOW. In this study, we examined cases of patients who developed complications following induction of buprenorphine in the ED, to determine if they met criteria for BPOW as well as describe their clinical course over time, including medications used to manage symptoms.

Study Methods: This study is a case series utilizing structured retrospective chart review in a convenience sample of patients from a large, urban academic health system. We included cases that were reported to toxicology and addiction medicine experts at the health system as potentially being BPOW. A chart abstraction tool was developed to extract relevant clinical information. Cases were reviewed to determine if they met a pre-specified definition of POW (Clinical Opioid Withdrawal Scale (COWS) $>$ 6 in 3 hours), and we describe patient characteristics as well as the clinical course following the event.

Results: Thirteen cases were reviewed. Nine of the cases met a pre-specified case definition of BPOW. In four cases, patients were administered buprenorphine without adherence to protocol and given buprenorphine with COWS score $<$ 6. Four patients experienced protracted opioid withdrawal without clear increase in COWS. All of the cases involved patients who used fentanyl either by self-report or on urine drug testing. The average period of self-reported abstinence from illicit opioids prior to induction was 17 hours. Patients manifested BPOW with gastrointestinal, neuro-cognitive, and autonomic dysfunction symptoms. Patients were managed with additional higher doses of buprenorphine and adjunctive medications such as clonidine, lorazepam, and ondansetron. The median dose of additional buprenorphine given was 16mg. The median length of time to resolution of symptoms was 7 hours.

Conclusions: BPOW is a severe worsening of withdrawal symptoms after the initiation of buprenorphine. In this convenience sample of patients with BPOW, fentanyl use and abstinence periods appropriate for short acting opioids were associated. Symptoms of nausea, vomiting, agitation, and diaphoresis led clinicians to order adjunctive medications. Although multiple protocols exist to support buprenorphine initiation, there is an absence of guidelines to support the management of BPOW or prolonged withdrawal symptoms. In this series, most of the patients had improvements with additional doses of buprenorphine.

No, authors do not have interests to disclose

283 Trauma Team Activation Fees Vary Widely Based on Region and Hospital Type

Zitek T, Pagano K, Singh Y, Mechanic O, Farcy D/Mount Sinai Medical Center, Miami Beach, Florida, US

Background: Trauma centers must be readily equipped to handle a variety of life-threatening injuries. As such, they charge a fee for the activation of their trauma team. Some popular media articles have pointed out that some trauma centers charge very high fees for trauma team activation, but a formal analysis of trauma activation fees has

never been performed. We thus sought to determine the trauma team activation fees for all trauma centers in the United States, and to explore the relationship between these fees and hospital characteristics.

Methods: This was a cross-sectional analysis of trauma centers in the United States listed on the American College of Surgeons' Web site (https://www.facs.org/search/trauma-centers?country=United%20States) as of March 4, 2022. We excluded military hospitals from the analysis. Next, we utilized the American Hospital Association directory to record the following for each trauma center: trauma center level and type (adult or pediatric), type of control (for-profit, governmental, church, or other nonprofit), hospital system, number of staffed beds, and whether there is an academic affiliation. Finally, we searched each hospital's Web site for their publicly available chargemaster, which is required to be available by federal law. We searched each chargemaster file for the standard charges for trauma team activation fees. If the chargemaster reported two levels of fees (such as for "full" and "partial" activations), we recorded both fees, which we considered "tier 1" and "tier 2". With that data, we calculated the mean and median trauma activation fees nationally and regionally. Finally, we performed univariate and multivariate linear regression to determine which hospital characteristics are associated with higher trauma activation fees.

Results: On March 4, 2022, there were 546 trauma centers listed on the American College of Surgeons' Web site. We excluded 5 military hospitals, and we were unable to find the trauma activation fees for 18 hospitals. As such, we analyzed the trauma activation fees of 523 hospitals. In this group, the median tier 1 trauma activation fee was $9500 (IQR: $5601-$17805); the mean was $13341. the lowest was $602 and the highest was $61734. There were 379 hospitals that reported a tier 2 activation fee, and for those, the median was $7914 (IQR: $4406-$13591). Compared to other regions, hospitals in the West region of the United States had the highest median tier 1 fee at $18099 (IQR: 10741 – 27607). In particular, California had the highest median tier 1 fees, with a median of $24057 (IQR: $15979-$33618). Additionally, for-profit hospitals charged significantly more than other types of hospitals, with a median tier 1 activation fee of $24500 (IQR: 14690-34184). On multivariate analysis, trauma activation fees remained higher in the West and among for-profit hospitals.

Conclusion: Trauma team activation fees vary widely among hospitals in the United States. In particular, there is marked regional variation, with the highest fees in the West. Additionally, for-profit hospitals charge higher fees. Future analysis should be conducted to determine what other differences in medical care systems and insurance coverage may contribute to these varying trauma activation charges.

No, authors do not have interests to disclose

284 Collaboration With a Bioengineering Senior Design Course to Develop a Novel Medical Device Facilitating Vessel Cannulation Under Continuous Ultrasound Guidance

Raithel M, Grzywinski M, Abdel-Hamid M, England P, Greineder C/University of Michigan, Ann Arbor, Michigan, US

Background: Critically ill patients in the emergency department (ED) and intensive care unit (ICU) often require invasive vascular access for monitoring and treatment. The Seldinger technique has remained the standard for vessel cannulation since it was developed over 50 years ago. The current procedure requires fine motor control at several steps including needle stabilization during guidewire insertion. Ultrasound has been incorporated into the procedure but the current technique does not allow for real time visualization of guidewire advancement. Physicians are often aware of limitations of existing medical technology, but they do not receive formal training in device design or development.

Study Objectives: In our study we have partnered with a bioengineering senior design course to create a novel device to update the current Seldinger technique of vascular access, allowing for one handed guidewire advancement and real time ultrasound visualization.

Methods: Three PGY-3 emergency medicine residents at an academic medical center identified the need for a novel device to improve the current Seldinger technique. The proposed device would facilitate venipuncture and guidewire advancement under continuous ultrasound guidance. The residents presented the clinical challenge and their solution to the students enrolled in the two semester bioengineering senior design course at their institution. The residents provided resources and taught the principles of the Seldinger technique to the engineering team. The team used this background to conduct a patent search to identify freedom to operate, define device requirements/specifications, generate potential designs, and create prototypes. Residents provided clinical insight and feedback throughout the course which shaped the final design and prototype. Later in the project, the team involved faculty with expertise in critical care and research for additional feedback and assistance with planning next steps.

Results: The interdisciplinary team of residents and engineers created a functional prototype ready for testing and filed a provisional patent application. The device simplifies venipuncture and guidewire passage to a single handed procedure. This modification then allows the user to maintain real-time ultrasound visualization of guidewire passage into the target vessel. The addition of a grip, wheel, and trigger mechanism improves procedural ergonomics.

Conclusion: We have developed a novel medical device to address existing gaps in the current Seldinger technique. Next steps in the current project include further prototype revisions, research on potential reduction in procedural completion times and complication rates, and exploring paths to commercialization. Our project demonstrates that physician collaboration with an engineering senior design course is a promising strategy for the development of novel medical devices.

Figure 1. Initial device concept.

Figure 2. First prototype.

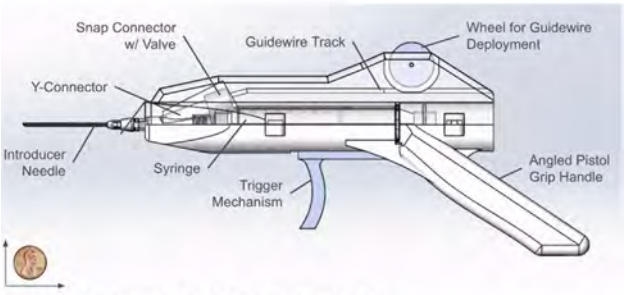

Figure 3. A diagram of the final device prototype.

Figure 4. A photograph of the final device prototype.

Yes, authors have interests to disclose
Disclosure: Dr. Raithel is an Inventor on a patent relevant to this project that is owned by the University of Michigan
Other
Dr. Raithel is an Inventor on a patent relevant to this project that is owned by the University of Michigan
Disclosure: Dr. Grzywinski is an Inventor on a patent relevant to this project that is owned by the University of Michigan
Other
Dr. Grzywinski is an Inventor on a patent relevant to this project that is owned by the University of Michigan
Disclosure: Dr. Abdel-Hamid is an Inventor on a patent relevant to this project that is owned by the University of Michigan
Other
Dr. Abdel-Hamid is an Inventor on a patent relevant to this project that is owned by the University of Michigan

285 Care for the Detainee in the Emergency Department Utilizing Simulation

Elue J, Vasa A, Winfield A, Amin D/Cook County Health, Chicago, Illinois, US

Study Objectives: Incarcerated patients represent a vulnerable population known to have an elevated burden of chronic disease and lower socioeconomic status. Mass incarceration in the United States leads to 10.9 million people passing through its jails, 6.7 million under correctional supervision, and 650,000 people returning to the community each year. The legal right to health care for incarcerated patients was established in 1976 but equitable and empathetic treatment by clinicians demands greater attention. Emergency medicine resident education has a persistent and notable gap in understanding health care for persons impacted by incarceration. Currently there are no published simulation scenarios aimed at teaching emergency medicine residents the health care disparities as well as patient rights of detainees, and techniques for intervening when witnessing discrimination.

Although implementing educational experiences in correctional health imposes unique challenges such as security concerns and logistical access to trainees, we identify the utilization of simulation to improve patient communication and improve safety and security when caring for patients in the correctional setting.

Study Design/Methods: The simulation was created as a part of emergency medicine intern orientation at a large county hospital that serves as the primary health care facility for a large detainee population. The scenario and learning objectives were created by a simulation trained emergency medicine attending and reviewed by an emergency medicine attending physician with expertise in caring for incarcerated patients. 17 learners were split into groups of no more than 4 and assigned a 30-minute time slot in which to complete the simulated case and a debriefing session. The simulated scenario used a live simulated patient and three confederates to serve as law enforcement and a nurse. To increase fidelity the patient wore handcuffs. Law enforcement were given badges and wore darkly colored clothing.

Learners completed an anonymous pre and postintervention survey to assess knowledge. The survey was deemed IRB exempt.

Results/Findings: During the scenario case, facilitators noticed there was significant disagreement as to whether the patient could leave against medical advice, if law enforcement could be removed from the patient's room with 50% of the teams electing to remove police from the room. All learners continued to appropriately evaluate the patient despite bias being introduced by confederates and none agreed to a drug screen as requested by police. Notably in all simulated sessions, multiple inappropriate comments include biased, discriminatory behaviors were tolerated by residents before appropriate intervention.

The survey revealed improvement of knowledge of detainees' ability to leave against medical advice, the consent process for drug screening for law enforcement, and the limitations of timely transportation to emergency department.

Conclusion: There is a paucity of formal education on caring for incarcerated patients in emergency medicine residency training. We describe how simulation-based education can improve the care for detainees with a specific focus on patient autonomy and managing difficult interactions with both clinical staff as well as law enforcement. We believe a similar methodology can be applied in the future to other vulnerable patient populations in hopes of improving disparate ED care.

Table 1

The table below displays the percentage of respondents with correct answers before and after the simulation.

Survey Questions	Pre-Simulation	Post-Simulation
Detainees cannot leave hospitals against medical advice.	5.89%	47%
Detainees can refuse medications, diagnostic testing, or procedural interventions even if they are deemed medically necessary.	100%	100%
Detainees in jail have been convicted of a crime.	100%	100%
Patient who is a detainee has a lower likelihood of a chronic condition than the persons in the general United States population.	100%	100%
Officers accompanying incarcerated patients should be included in the medical decision making.	100%	100%
Timely transportation to hospitals from jail is not a barrier for the care of a detainee patient.	88%	100%
Detainee patients need to consent to toxicologic or other drug screens for law enforcement.	52.9%	70.5%

No, authors do not have interests to disclose

286 Trends in Trauma Admissions and Severity at a Level II Trauma Center During the COVID-19 Pandemic

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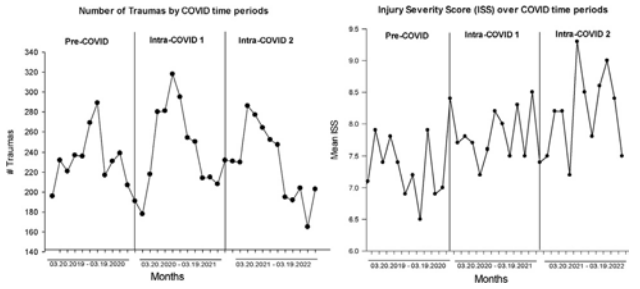
Study Objectives: To characterize the impact of the COVID-19 pandemic on trauma admissions and outcomes at a large, Level II Trauma Center that services a metropolitan area.

Study Design/Methods: The study is a retrospective review of emergency department trauma patient data from an urban, Level II Trauma Center in Columbus, Ohio. Data were grouped into 3 time periods reflecting (1) the year prior to the COVID-19 pandemic (Pre-COVID; March 20, 2019 – March 19, 2020), (2) one year after the start of COVID-19 lockdowns (Intra-COVID 1; March 20, 2020- March 19, 2021), and (3) the second year of the pandemic following lockdown (Intra-COVID 2; March 20, 2021-March 19, 2022). The primary outcome assessed was the number of trauma admissions per month. Secondary outcomes included injury severity score (ISS) and incidence of blunt versus penetrating trauma. Characteristics of trauma patients admitted during the Pre-COVID period were compared with patients presenting during the Intra-COVID periods. Categorical data were compared with $\chi 2$ and Fisher's exact tests, and continuous data were assessed with One-way ANOVA and Kruskal-Wallis tests when appropriate. All analyses were conducted using SAS 9.4 (SAS Institute, Cary, NC) with two-sided p-values <0.05 considered statistically significant.

Results/Findings: A total of 8349 trauma admissions (median age 60 years; 51% male) were included in the final analyses. There were no differences in age, sex, and race of trauma patients presenting to the Level II Trauma Center during the study time periods. Relative to the Pre-COVID data, the number of trauma admissions increased (9%) during the Intra-COVID 1 period (2695 vs 2932, $p<0.0001$), with concomitant higher acuity evidenced by a 7% increase in mean ISS score (7.3 ± 6.9 vs 7.8 ± 6.9, $p=0.0009$). There was a modest, but significant increase (2695 vs 2722, $p=0.001$) in trauma admissions during the Intra-COVID 2 period as compared to the Pre-COVID period as well; with concomitant higher acuity reflected by an 11% increase in mean ISS score (7.3 ± 6.9 vs 8.1 ± 7.2 $p<0.0001$). During both Intra-COVID periods, there was a significant increase in penetrating traumas as compared to the Pre-COVID period (4% Pre-COVID vs. 7% Intra-COVID 1 and 2, $p=0.001$).

Conclusion: Review of emergency department trauma data demonstrated an increase in trauma admissions, acuity of injury and an increase in penetrating trauma, at a community hospital level II trauma center, during the COVID-19 pandemic period, when compared to the pre-pandemic period. This data could have significant implications, especially in trying to understand the impact the pandemic had on society, and community hospitals with a level II trauma designation.



No, authors do not have interests to disclose

287 Influence of Time to Diagnosis on Time to Percutaneous Coronary Intervention for Emergency Department ST Elevation Myocardial Infarction (STEMI) Patients: Door to ECG Matters

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Study Objectives: Earlier percutaneous coronary intervention (PCI) for patients with ST-Elevation Myocardial Infarction (STEMI) is associated with improved clinical outcomes, and earlier ECG is associated with earlier PCI. However, the degree to which door-to-ECG (D2E) influences time from ECG to PCI balloon intervention (E2B) is unclear. We sought to evaluate the impact of D2E time on E2B.

Methods: We performed a three-year retrospective cohort study including STEMI patients from 10 geographically diverse emergency departments (EDs) who had an emergent plan for PCI. We excluded patients with a screening ECG completed prior to ED arrival and those whose initial ECG was non- diagnostic. Our primary outcome was E2B. We compared characteristics between patients who achieved D2E within 10 minutes and those who did not (>10 minutes). We defined three clinical process opportunities for a timely ECG: ED intake (0-10 minutes), triage (>10-30 minutes), and main ED evaluation (>30 minutes). We used a linear mixed-effect regression model to evaluate the influence of D2E on E2B with piecewise linear terms for intake, triage, and the main ED evaluation. We adjusted for patient demographics identified upon ED arrival and past medical history. We modeled ED site as a random effect.

Results: We studied 576 patients, and D2E was timely (≤10 minutes) in 65.8% (379/576). Among patients with untimely D2E (>10 minutes), median E2B interval was longer compared to those with timely D2E (76 vs 68 minutes, p<0.001). The association between D2E and E2B was only statistically significant in the 11-30 minute "triage" phase where a one-minute change in D2E was associated with a 1.24-minute (95% CI:0.44- 2.05, p=0.003) change in E2B time (Figure 1).

Conclusion: Patients with an untimely D2E time were more likely to have an increased E2B time. However, the adjusted association was only significant among those diagnosed during the triage phase of care. The greatest opportunity for improving E2B among ED-diagnosed STEMI patients is to capture those currently diagnosed during triage during the preceding phase of care, ED intake.

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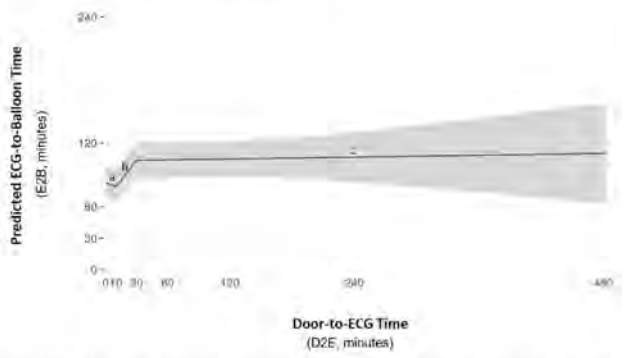
Figure 1 – Piecewise Linear Mixed Effects Regression Model for the Association between Door-to-ECG (D2E) and ECG-to-Balloon (E2B) Time



Each piece of the model represents a period of ECG acquisition opportunity within the ED care phase. The 3 ED opportunities include ED intake (a) the first 0-10 minutes, triage (b) 11-30 minutes, and the main ED evaluation (c) >30 minutes. The slope of the line represents the change in E2B for each unit of D2E. We found the only statistically significant association with triage where a one-minute change in D2E was associated with a 1.24-minute change in E2B time.

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288 Relationship Between Socio-Economic Background of International Medical Graduates and Residency Match Results

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Study Objective: Up to 25% of practicing American physicians are international medical graduates (IMGs). There are multiple studies characterizing the social and economic background of American medical students and residents. However, studies of IMGs are lacking despite their substantial prevalence in American health care. Little is known about the countries of origin of international physicians and determinants of their success. Our study is aimed to characterize the impact of IMG socio-economic background on the rate residency match success.

Methods: We created a survey with questions on residency match related data and information related to personal socio-economic background. An invitation to participate in the survey was then sent to 4,917 IMGs who applied to 7 specialties with highest number of matched international residents (according to National Residency Match Program 2021 data) within our institution in 2022 residency match. Other residency programs were excluded to prevent accidental identification of the participants and due to small number of potential IMG respondents. Each item was compared between the matched and unmatched groups using two- sided Kruskal-Wallis, Chi-squared or Fisher's exact tests.

Results: A total of 442 survey responses were recorded (response rate 8.98%). 48% of the respondents identified as females, 52% as males, mean age 29.2 +/- 4.4 There were 326 (73.8%) respondents who reported securing a residency position and 116 (26.2%) who did not. There was no difference in personal income between the matched and unmatched graduates — 25.6% of matched respondents reported personal income slightly or significantly higher than other people in their city vs 22.8% of unmatched respondents (p=0.637). However, family income while growing up was significantly higher for matched graduates. A total of 51.1% of matched residents reported their family income was slightly or significantly higher than other people in their city, compared with 37.7% of unmatched graduates providing the same responses (OR = 1.72, 95% CI: 1.11 - 2.67, p = .014).

Unmatched graduates reported investing more during the match process with 52.6% of unmatched graduates indicating that they spent more than 1 year of income during the process compared to 38.6% of matched graduates (p = .013). Parental occupation also differed between matched and unmatched graduates. Matched graduates were more likely to have at least one parent working in health care or social services compared to unmatched graduates (OR = 1.89, 95% CI: 1.12 - 3.18, p = .016). USMLE Step 1 scores were also higher among the matched applicants compared to the unmatched applicants with score of 230 or higher associated with significantly improved chance to match (OR = 3.71, 95% CI: 2.37 - 5.82, p < .001). Similar

trends were observed for USMLE Step 2 CK scores 240 or above (OR = 3.24, 95% CI: 2.08 - 5.07, $p < 0.001$).

Conclusion: Our study demonstrates that there may be an advantage in the residency matching process to IMGs from a high socio-economic background. Considering the economic burden of the residency match process on applicants, efforts to further identify which factors determine success of IMGs in the residency match will help to create the most equitable system for IMGs graduates across all socio-economic strata.

No, authors do not have interests to disclose

289 Impact of an Emergency Department Quality Improvement Initiative to Promote Safe Discharge of Low-Risk Chest Pain Patients

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Study Objective: Through participation in the Michigan Emergency Department Improvement Collaborative (MEDIC), an interdisciplinary team of physicians, advanced practice professionals, and nurses aimed to increase the safe discharge rate of adult low-risk chest pain patients. The purpose of this quality improvement project was to implement a standardized clinical pathway, including the use of the HEART score to promote the safe discharge of low-risk emergency department (ED) patients with chest pain.

Methods: This was a retrospective before and after study of consecutive adult patients seen at EDs in West Michigan. Spanning 13 counties in Michigan, affiliated institutions included three rural medical centers, two university-affiliated hospitals, and three community hospitals. The study periods spanned 3 months (Jan- March 2021) before the project was initiated and 3 months (Oct-Dec 2021) post-intervention. Donabedian's methodology was used as a framework to create a quality improvement bundle to promote a standardized pathway to evaluate ED patients presenting with a primary complaint of chest pain. Demographic information, medical history, treatment, and disposition were obtained from ED records using a structured abstract. Chi-squared and t-tests were used to compare the pre- and post-intervention groups across key outcome variables.

Results: During the two study periods, a total of 2,595 patients met the inclusion criteria; averaging 432 evaluated per month across the eight affiliated hospitals. Between pre- and post-intervention study periods, the number of patients who had a HEART Score documented increased from 32.5% to 75.2% [percent difference 42.7%; 95% CI 40.0 to 45.5%]. This equates to a relative increase of 143.2%. A similar change in HEART Score documentation was found across individual study sites ($p < 0.001$). In addition, safe discharge rates of low-risk chest pain patients were at 96.9% [95% CI 95.4 to 98.6%] in December of 2021, favorably above the performance benchmark established by MEDIC.

Conclusions: Standardizing the use of an evidence-based risk stratification tool for ED patients presenting with a chest pain-like diagnosis is feasible within a multiple heterogenous and competing institutions. Implementation of the tool and standardized pathway effectively increased the percentage of ED patients with a chest-pain-like diagnosis with a HEART Score documented and improved performance towards the MEDIC measure safe discharge for adults with low-risk chest pain. Engaged physicians, nurse abstractors, quality leadership, and resources from MEDIC supported the successful execution of this intervention.

No, authors do not have interests to disclose

290 Trauma Patients in Police Custody - Who Are They and How Were They Injured?

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Study Objectives: The United States has the highest incarceration rate in the world by a large margin, with 629 individuals incarcerated for every 100,000 citizens in 2019. Individuals in police custody represent a vulnerable subset of trauma patients at risk for disparate care. Though the literature on mortality of persons in police custody is growing, less research exists on morbidity. Hence, we sought to characterize traumatic injuries of persons in police custody at a single urban trauma center. We hypothesized that the injuries sustained by patients in policy custody would be the same as the injured population in general and would be from blunt force trauma, such as motor vehicle collisions.

Study Design/Methods: Our study was a retrospective cohort study that used data from the institutional portion of the national trauma registry from a nationally verified Level 1 trauma center in Atlanta, Georgia. The patient population in this dataset included hospitalized adults (18 years or older) who arrived to the emergency department and/or were discharged from the hospital in police custody between Jan. 2016 and Dec. 2020. A comparison cohort included patients within the same database who were not in police custody in a three-to-one matching ratio based on chief complaint. Patient demographics, injury patterns, clinical characteristics and outcomes were analyzed by logistic regression in SAS.

Results/Findings: There were 24,695 hospitalized trauma patients over the study period in the database. Of these, 738 (3%) were under custody of law enforcement, of which 79.7% (n=588) were Black with a mean age of 34.7 years (95% CI 22.7–46.7; SD +/- 12). The most frequent environment for injury (n=302, 40.9%) was on the street (ie, not a facility or other specified building). Blunt force trauma (n=452, 61.25%) was a more common mechanism than penetrating trauma (n=286, 38.75%). By looking at chief complaint, 26% (n=192) were injured by firearm, 24.93% (n=184) were assaulted and 21% (n=155) were injured in a motor vehicle collision. The mean injury severity score (ISS) was 10 (95% CI 9.4–10.6; SD +/- 8). Emergent operations were required in 428 (58%) patients and 27% (n=202) were admitted to the intensive care unit (ICU). Injured patients in custody were more likely to be Black (OR 1.64; 95% CI 1.33–2.02), male (OR 2.98; 95% CI 2.29– 3.88), have a self-inflicted injury (OR 2.48; 95% CI 1.54–4.01), and have a major psychiatric illness (OR 2.14; 95% CI 1.27–3.60).

Conclusion: Patients with law enforcement interactions, either prior to ED arrival or with subsequent discharge to custody, represent an important subset of trauma victims. Demographically, these patients were significantly more likely to be Black and have a history of mental illness. Overall, the characteristics of this group mirror the disparities already well identified in the carceral system. Most patients in police custody were hospitalized as the result of blunt force trauma, with the leading causes of injury being firearm, assault, and motor vehicle collision. Further, injury in this population is associated with significant health care and societal costs as evident by the need for emergent operations and ICU level care. Further studies will be required to explore community factors, understand health disparities, and identify potential targets for intervention in this population.

No, authors do not have interests to disclose

291 Caustic Ingestions: Does Intent Matter

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Study Objectives/Background: Clinicians may encounter patients who consume caustic agents for either exploratory/accidental means, or for suicidal purposes. There is some debate in the literature with regards to the evaluation of asymptomatic individuals who consume caustics for suicidal purposes, with some advocating esophagogastroduodenoscopy (EGD) for all suicidal patients, even if asymptomatic. The primary purpose of this study was to evaluate if asymptomatic suicidal patients who ingest caustic agents routinely need an EGD performed.

Methods: This multicenter, multinational study evaluated patients between 1 January 2014 through 31 December 2020, who presented with a caustic ingestion. A significant esophageal injury was defined as having a grade IIb or III burn or if the patient died without an EGD, whereas non-significant esophageal injury was defined as having a grade 0, 1, or IIa burn. In addition, for those patients without an EGD, if follow up was available at least 30 days after the initial ingestion and no esophageal procedures were performed, patients were also considered to have a non-significant esophageal injury. Burn classification was based on the Zargar grading system. Symptoms were defined as dysphagia, dysphonia, vomiting, or oropharyngeal lesions. Isolated pain was not defined as being symptomatic.

Results: A total of 409 patients were identified. Males accounted for 203 (49.6%) of subjects. The median (IQR) age was 18 (4-31) years, with an overall age range of 10 months to 78 years. Suicidal ingestions accounted for 155 (37.9%) of cases. The presence of dysphagia or dysphonia was more likely in those with significant esophageal injury compared to those without (59.3% vs. 12.6% respectively); OR 10.1; 95% CI 4.43-23.1. Among 27 patients with significant esophageal injury, 48% were found in suicidal patients, compared with 51.9% in non-suicidal patients (p=NS). On multivariate regression, there was no significant difference in the rate of significant esophageal injury among suicidal vs. non suicidal patients (OR 1.55; p=0.45, 95% CI 0.45-5.33) . No patient with significant esophageal burns was asymptomatic.

Conclusion: In this large multicenter series of caustic injury, suicidal intent was not associated with increased rate of esophageal injury. Thus, routine EGD in patients without symptoms is not necessary, even among suicidal patients.

No, authors do not have interests to disclose

292 Spanish Versus English Language Use of Stroke Evaluation Process

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Background: Emergency departments (ED) use stroke screening tools and processes to rapidly triage patients who may need immediate imaging and physician decision making to treat stroke in a time dependent manner. Current research suggests patient language preference does not affect quality of care, but little investigation has been done specific to stroke evaluation. By measuring for an association between preferred language and the conversion rate from stroke screening at presentation, to further comprehensive stroke evaluation, we aim to evaluate possible process differences in care by language.

Methods: This is a retrospective study of all patients who, during 2020, received an initial CODEFAST evaluation upon arrival in the ED at an urban county hospital. CODEFAST is the initial screen by nurses at arrival when deficits either subjective or objective are reported that may represent stroke. It triggers immediate emergency physician evaluation. The language reported by the patient as 'preferred for discussion of their health care' is documented in the electronic medical record (EMR) and is the language preference used in this study. Inclusion criteria includes patients who are documented in the EMR as CODEFAST activations or arrive in the CODEFAST room. Patients activated for comprehensive stroke workup prior to ED arrival were excluded. Patients speaking a language other than Spanish or English were coded as 'other'. We measured the conversion rate from positive ED stroke screening (CODEFAST) to full ED comprehensive stroke evaluation (immediate neurology consult and consideration for mechanical or pharmacologic thrombectomy). This conversion rate was calculated as: number of patients who receive a comprehensive stroke evaluation divided by number of ED stroke screens (CODEFAST activations), and then stratified by language. For statistical analysis, we calculated a 95% confidence interval (CI) for proportions and difference in proportions.

Results: From 857 CODEFAST activations, 800 patients met inclusion criteria. The mean age was 52 years (SD=15), with 44% male. English speaking patients comprised 60.4% (95% CI 56.9-63.8%), Spanish speaking was 37.3% (34.0-40.8%), and 'other' was 2.5%. Of all CODEFAST patients, 30.6% (95% CI 27.5- 34.0%) went on to be converted to comprehensive stroke evaluation. For Spanish speaking patients, the proportion is 26.4%, compared to 32.5% for English speaking patients (6.1% difference; 95% CI -.53 to 12.5%). 'Other' language had a conversion ratio of 47.3%. The difference between English and all non- English speaking patients was also not statistically significant (difference of 4.9%, CI -1.6% to 11.2%). Overall, 12.6% arrived via EMS, of whom, 77% were. English and 20% were Spanish speaking. For these EMS patients, there was also no significant difference in the proportion going on from CODEFAST to comprehensive stroke evaluation (difference of 14%; CI -17% to 40%).

Conclusion: In this sample, there was no statistically significant difference between English and Spanish speaking patients with respect to the process outcome of escalation to comprehensive stroke evaluation. Next steps for this work include evaluation of the outcome of true stroke as well as measurement of last known well time stratified by language.

No, authors do not have interests to disclose

293 Return Rates for Opioid Versus Non-Opioid Management of Abdominal Pain in the Emergency Department

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Study Objectives: Patients with abdominal pain comprise a large percentage of patients presenting to the emergency department (ED) and management of these patients can be challenging, especially when no indication for admission is identified. While opioids are often administered in the ED for this group of patients, research suggests this practice may contribute to long-term opioid use in some of these patients without significant long-term benefit with regard to symptom management. This study seeks to assess the association between the use of opioids for management of abdominal pain in the ED and return ED visits within 30 days for patients discharged from the ED at initial presentation.

Methods: We conducted a retrospective, multi-center observational study of adult patients presenting to and eventually discharged from 21 EDs with a chief concern of abdominal pain between November 2018 and April 2020. The patients were then sorted by the types of medication administered in the ED. The proportion of return visits to the ED within 30 days for patients who received any form of opioid analgesic was analyzed in relation to a reference group consisting of patients who only received acetaminophen, nonsteroidal anti- inflammatory drugs (NSAIDs), or a combination of both. Data were analyzed through the use of logistic regression models in order to calculate the odds ratios (ORs) and 95% confidence intervals (CIs).

Results: Of the 4,745 patients who presented to and were eventually discharged from the ED with abdominal pain, the mean age was 46 years (SD 19.2), and 63.2% were female; 78.1% were White, 8.0% Black, 5.6% Hispanic, 2.4% Asian/Pacific Islander, 0.4% Native American, and 5.4% other. Of these patients, 1,304 (27.5%) received opioids while 1,101 (23.2%) only received either acetaminophen, NSAIDs, or both. Of the patients in the opioid group, 287 (22.0%) returned to the ED for abdominal pain within 30 days, compared to 162 (14.7%) of those in the reference group (OR 1.57 [1.27-1.95], p-value <0.001).

Conclusion: Among patients presenting to the ED with abdominal pain, those given opioids were more likely to return to the ED within 30 days as compared to those given only acetaminophen and/or NSAIDs. While it is possible that patients who were in more severe pain received opioids and were therefore more likely to return to the ED, we believe this limitation is minimized by the fact that our study only included patients who were discharged from the ED, thus excluding any patients who had findings or symptoms significant enough to warrant admission. Our findings suggest that ED physicians should strongly consider the use of nonopioid analgesics as first line therapy for undifferentiated abdominal pain in the ED, especially in patients for whom discharge is anticipated, based on the association with lower return rates. Larger prospective studies are needed to further assess this association.

No, authors do not have interests to disclose

294 Rapid High-dose Buprenorphine Induction for Fentanyl-Using Patients by Paramedics

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Study Objectives: To describe the characteristics and clinical outcomes among patients who report a primary use of fentanyl participating in a pilot project of emergency medical services (EMS) high-dose buprenorphine field initiation.

Methods: Using an implementation science evaluation framework we evaluated clinical and administrative data collected as part of an ongoing EMS buprenorphine project in Contra Costa California from September 2020 and April 2022. The EMS buprenorphine protocol is initiated when an EMS patient is suspected by paramedics to have opioid use disorder and acute moderate to severe withdrawal. Patients suspected of withdrawal for any reason: abstinence, naloxone reversal, and buprenorphine precipitated withdrawal are eligible for treatment. Patients who reported fentanyl as their primary drug of abuse during initial EMS assessment were included in this analysis. All patients who received treatment were followed by a dedicated clinical team that included a substance use navigator and a physician. Eligibility for buprenorphine treatment was determined real-time by an on-call physician expert consultation. Patient treatments and clinical outcomes were evaluated on an ongoing basis by a multidisciplinary implementation team. Clinical data was abstracted from the electronic medical record and care navigation documentation. Descriptive statistics were performed.

Results: Between September 2020 and April 2022, 54 patients were identified with opioid use disorder and acute withdrawal and treated with buprenorphine in the field by EMS. Of these, 28 (51.8%) reported fentanyl use in the last 72 hours. Eleven fentanyl users were female (39.2%) with a mean age of all patients of 33.4 years. Seventeen were male (60.7%) with a mean age of 35.1. Self-reported race ethnicity was 21.4%(6/28) Black/African American, 60.7% (17/28) White/Caucasian, 7.1%(2/28) Hispanic/Latine, 1.1%(3/28) Asian/Pacific Islander. Reason for withdrawal was determined to be abstinence, naloxone reversal of overdose, and home buprenorphine precipitated withdrawal in 11(39.2%), 14(50%) and 3(1.0%)cases respectively. There were no cases of precipitated withdrawal as a result of EMS buprenorphine treatment. There were no cases of excessive respiratory depression or sedation. At 30 days, 11(39.2%) of fentanyl users treated with EMS buprenorphine were engaged in outpatient addiction treatment.

Conclusion: To date, fentanyl using patients treated in the field for opioid withdrawal with first dose of 16mg of SL buprenorphine by paramedics have not been observed to have adverse events and have a remarkably high follow up engagement in treatment at 30 days.

No, authors do not have interests to disclose

295 Updating Patient Care: Where Do We Begin

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Study Objectives: It is paramount for emergency departments (EDs) to stay up-to-date on all treatment protocols and improved workflow operations. However, changing how an ED operates is challenging. In our ED, we used a multidisciplinary multi-step

model to implement changes in resuscitative fluid administration for septic patients. Our primary aim was to figure out the most efficient method on introducing new protocols in our ED. The secondary aim was to increase the use of LR for fluid resuscitation of patients with suspected or confirmed sepsis. We hypothesized that by involving all medical staff on the proposed change, they would be implemented at a higher rate.

Methods: The study was conducted over 24 months. Data was gathered for three months following each of the three interventions. They constitute educating the health care providers about the principles behind using lactated ringers (LR) over normal saline 0.9% (NS). Nurses' education was the second intervention. The last intervention was improving the availability of LR in the department itself.

Each visit to the ED for sepsis or suspected sepsis was categorized into one of three groups based on treatment: NS only, LR only, or both NS and LR. Numeric features are summarized with medians and interquartile ranges (IQRs) as well as means and standard deviations (SDs); categorical features are summarized with frequency counts and percentages. The type of treatment for sepsis was compared between intervention cycles using chi-squared tests.

Results: A total of 995 distinct ED visits were recorded at baseline and across each of the intervention cycles - 375 (37.7%) during the baseline, 218 (21.9%) during the first intervention, 216 (21.7%) during the second intervention, and 186 (18.7%) during the third intervention. Here we find a significant difference in treatment between the 4 cycles ($p < .001$). Compared to baseline, the number of patients treated with LR or both LR and NS was not significantly different during intervention 1 (10.4% vs 12.4%, $p = .545$). However, both intervention 2 and intervention 3 saw significant increases in the patients treated with only LR or both LR and NS (Int. 2: 10.4% vs 37.0%, $p < .001$; Int. 3: 10.4% vs 34.4%, $p < .001$). Additionally, both intervention 2 and 3 had significantly higher rates of treatment with LR compared to intervention 1 ($p < .001$ for both). There was no difference between intervention 2 and intervention 3.

Conclusion: In conclusion, change is implemented by involving multiple team members. While it is natural to think that attempting to implement change at the health care providers level would yield the most significant results, however introducing the change at a nursing level and altering the location of the fluids yielded the most significant results. EDs should consider using a multidisciplinary approach to introducing new workflow operations and treatment protocols to all their medical staff.

No, authors do not have interests to disclose

296 US National Trend of Cyclobenzaprine Use in Emergency Departments 2007-2019

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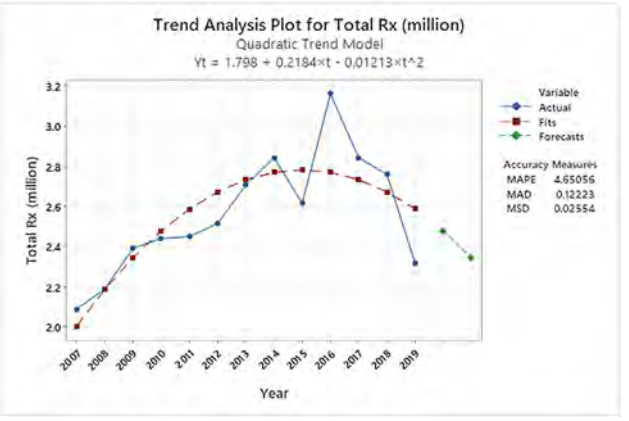
Background: Lower back pain (LBP) is one of the more common causes of emergency department (ED) visits, resulting in significant socioeconomic impacts on United States (U.S.) health care. Because patients' LBP is often a subjective experience, providers rely on one or more classes of medications to provide symptomatic relief. As such, muscle relaxants, such as cyclobenzaprine hydrochloride, are frequently used to manage LBP, though there is insufficient evidence to support their use.

Study Objective: The aim of this study is to evaluate current trends regarding cyclobenzaprine hydrochloride use in U.S. EDs.

Methods: A review of the National Hospital Ambulatory Medical Care Survey was performed. Using drug codes provided by the CDC, patients who were at least 18 years old and were administered or prescribed cyclobenzaprine hydrochloride between 2007 and 2019 were identified. Bivariate and time series analyses were performed to evaluate patient demographics, payment sources, imaging studies, and trend of cyclobenzaprine prescribed to patients.

Results: Between 2007 and 2019, there were 1.4 million relevant LBP encounters in the U.S., with 33.3 million (2.36%) of them resulting in the prescribing of cyclobenzaprine. Among the patient encounters where cyclobenzaprine was prescribed, 18.8 million (56%) were female and 14.4 million (44%) were male [Difference 12%, 95% CI (-1.75, 26), P = 0.12]. The distribution of patients prescribed cyclobenzaprine during the study period by age were: 5.4 million (16%) aged 15 to 24 years, 15.6 million (47%) aged 25 to 44, 10.2 million (30%) aged 45 to 64, and 2.2 million (7%) aged 65 or older. Between 2007 and 2016, the number of patients prescribed cyclobenzaprine increased from 2.1 million (6%) patients in 2007 to 3.2million (9.5%) patients in 2016 (Difference 4%, 95% CI -11.5%, 3.5%, P = 0.44). In contrast, there were only 2.3 million (7%) patients received cyclobenzaprine in 2019, 3% less than in 2016 (95% CI -4.7%, 10.7%, P = 0.61). Among those who received cyclobenzaprine, 2.9 million (44%) patients underwent x-ray imaging, 1.2 million (18%) underwent Computed Tomography scan, and 173248 (3%) patients underwent Magnetic Resonance Imaging. Of the LBP patients' ED visits, back pain (38.1%), neck pain (11%) and motor vehicle accidents (6.5 %) were the most common reasons. A quadratic times series model best fit to the trend's cyclobenzaprine prescriptions over the 12-year period predicted that cyclobenzaprine prescriptions be 2.5 million in 2021 and 2.3 million in 2022.

Conclusions: Despite the limited evidence for the use of cyclobenzaprine hydrochloride for LBP, these results show it was prescribed frequently prescribed medication between 2007 and 2019 with prescriptions predicted to decline but continue on a large scale. These findings may better inform future research regarding the effectiveness of cyclobenzaprine for LBP in different patient populations.



No, authors do not have interests to disclose

297 Creating a Framework for Mass Casualty Response Infrastructure

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Study Objectives: With markedly increasing urbanization around the world, strengthening of urban disaster response capacity is a global priority. Four billion people in the world's cities are estimated by the Sustainable Development Goals of the United Nations to have inadequate urban infrastructure and services. Cities are becoming increasingly at risk for a myriad of disasters due to a confluence of environmental, political, economic, and social factors. Well-functioning urban emergency health response systems are critical to the survival and well-being of one's population. However, despite global calls for improving disaster response in urban areas, there is poor understanding of the unique challenges of emergency response in urban areas, particularly in low middle income countries (LMICs). This study aimed to develop a conceptual framework for mass casualty response to help develop an urban preparedness measurement tool.

Methods: We developed a framework for mass casualty response for LMIC using primarily qualitative methods. We conducted literature review, in-depth interviews, focus group discussions, and a modified Delphi process to develop the framework.

Results: This paper synthesizes the findings from four methods to create a framework with which to approach an appropriate mass casualty incident (MCI) response. Through the literature review, and then the thematic analysis of the in-depth interview and focus group data, nine essential components of an urban emergency response system in a low-resource setting were identified, along with assessment methodologies for evaluating response capacity. These components included communication, safety and security, human resources, policy, procedures and plan, command control and coordination, and care delivery. The modified Delphi process did not contradict any components from the qualitative research, or suggest they lacked importance. Recognizing the importance of these components can help policy makers prioritize interventions to address challenges and improve upon response capacity.

Conclusion: Using an innovative and robust mixed-methods approach, we have created a framework which attempts to provide much needed guidance to decision makers (and other stakeholders) to begin to improve the planning and assessment of mass casualty management systems in cities around the world. This study has helped elucidate the elements of MCI response which can be used to assist cities in their city's

emergency care efforts. The study team hopes to empower city leaderships around the world to better understand and address gaps in their mass casualty response systems.

No, authors do not have interests to disclose

298 Evaluation of a Multi-Pronged Emergency Department-Based Approach to Reduce Subsequent Overdoses in a High-Risk Emergency Department Population of Opioid Users

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Study Objectives: Opioid use disorder (OUD) is a continually expanding problem with a high rate of mortality, and the emergency department (ED) is the primary health care system entry point for patients with OUD. Each encounter represents an opportunity to help prevent a subsequent overdose (OD). Our department developed a multi-pronged approach to confront the opioid epidemic, including providing take-home naloxone to at-risk patients, initiating medications for opioid use disorder (MOUD), and starting an ED-based peer support and recovery program (ED-PSRP) to provide patients with direct linkage to treatment facilities from the ED. The purpose of this study was to determine the effect of this multi-pronged approach on subsequent fatal or nonfatal 90-day ODs in ED patients with an acute presentation of OUD.

Methods: This IRB-approved retrospective analysis took place at a large urban Midwest ED. Patients with an acute presentation of OUD (defined by the ED encounter diagnosis such as acute opioid overdose (OD), withdrawal) from November 2017 to December 2020 were included. The primary outcome was subsequent 90-day OD, either by an ED encounter for OD or opioid OD death by coroner (outcome data collected through March 2021). Statistical comparisons were made using binary logistic regression and Chi-squared test when required.

Results: There were 1676 OUD patients presenting to the ED between November 2017 and December 2020. A total of 309 (18%) received take-home naloxone, 223 (13%) received MOUD, 531 (32%) spoke with the ED-PSRP, and 162 (9.6%) were transported directly to a treatment facility. There were 110 (6.5%) subsequent 90-day ODs during the study period. The 90-Day OD rate decreased significantly with each year (16.2% 90-day OD rate in Nov and Dec of 2017, 6.8% in 2018, 5.2% in 2019, 2.1% in 2020, p=0.001). This rate contrasted with the State of Ohio's unintentional overall OD death rate, which while showing a decrease from 2017 to 2018, saw a 7% increase in OD deaths from 2018 to 2019 and a 25% increase from 2019 to 2020. No single intervention was statistically significant to determine the primary outcome.

Conclusion: A multi-pronged ED-based approach to combat the opioid epidemic is associated with reduced 90-day OD in patients with an acute presentation of OUD.

No, authors do not have interests to disclose

EMF 299 Community Outreach for Patient Engagement: A Randomized Controlled Trial Using Implementation Framework

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Study Objectives: The University of Vermont Health Network (UVMHN) is the largest health care system in Vermont (VT) and New York's northern region, serving a rural catchment area of over 1 million people. We have identified that there is a critical need to address patients' difficulty with accessing primary/subspecialty care, resulting in frequent ED visits. For patients who visit the ED >3 times in the past 90 days, the Community Outreach for Patient Engagement (COPE) program aims to reduce emergency department (ED) utilization and address rural health care disparities by improving access to primary and subspecialty care follow up, expanding adherence to care plans and health care markers (increased medication adherence, housing stability, and food security), and decreasing costs by reducing ED use through improved access to health care.

Study Design/Methods: This is a randomized controlled trial using implementation framework. COPE is a multidisciplinary team comprised of an ED nurse and Community Paramedics. Participants meeting eligibility criteria are randomly assigned in a 1:1 ratio to the in-person (intervention) or telephone follow-up only (control) groups. In-person, low barrier visits occur in the community, and address clinical and social determinants of health needs. Based on the patient's determined needs, these visits occur as frequently as daily ranging to weekly. Our primary analysis is based on the intention-to-treat principle to preserve randomization. We are employing multivariable modeling methods to explore and address potential residual confounding by unbalanced factors associated with ED usage. Patients who have visited the University of Vermont Medical Center (UVMMC) ED greater than three times in the past 90 days, and who live in Chittenden County, VT, are eligible. Patients are excluded if they have a recent history of violence or are under the age of 18. For 80% power to detect a clinically meaningful change, we seek to enroll 96 participants over one year.

Results/Findings: In the first three months of the study, 29 subjects have been enrolled, 15 in the in-person arm and 14 in the phone call arm. Demographics across groups appear similar, with an average age of 53 in the in-person arm and 47 in the phone call arm. Most of the patients are white males with state or federal insurance. In the 12 months before enrollment, in-person participants had visited the UVMMC ED an average of 20.3 times, whereas phone call participants 16.2 times. Phone call patients had a pre-intervention visit per week (VPW) of 0.31, and a post-intervention VPW of 0.36 (an increase of 0.05), whereas in-person patients had a pre-intervention VPW of 0.39 and a post VPW of 0.30 (a decrease of 0.09). These differences are not statistically significant.

Conclusion: While these are interim findings, and an analysis of health outcomes has not yet been completed, COPE appears promising as our in-person intervention has shown fewer ED visits compared to pre-enrollment. As the study continues, currently enrolled subjects progress, and new subjects are enrolled, we anticipate more robust results that can aid in assessing the benefit of this program.

* COPE clinical team: Amanda Young, Nicholas Deavitt, and Randall Lanier.

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300 Understanding the Relationship of Key Demographic Indicators on COVID-19 Rates in Emergency Department Settings During Surges

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Study Objectives: Coronavirus disease 2019 (COVID-19) continues to have a disproportionate impact on certain populations, particularly racial and ethnic minorities, persons experiencing homelessness, and people living with comorbidities. The purpose of this study was to examine the differences in COVID-19 positivity rates between two surges among key demographic groups.

Methods: This is a cross-sectional study to assess the differences in COVID-19 positive patients from the December 2020-January 2021 and December 2021-January 2022 COVID-19 surges from two emergency departments (EDs). One ED is an urban academic hospital, and the other is a suburban quaternary medical center with a combined annual census of approximately 85,000 visits. Pearson's Chi-square test was used to test the goodness-of-fit of age, race, ethnicity, BMI, and comorbidities using the Charlson Comorbidity Index. Pearson's Chi-square test of independence was used to test homelessness status. A p-value less than 0.05 was used to indicate statistical significance.

Results: During the 2 surges, 11,634 patients were tested for COVID-19 in two ED settings where 2,126 patients were confirmed positive (18.3%). Of these, 811 (38.1%) identified as Hispanic, 1,316 (61.9%) identified as a non-White, 1,434 (67.5%) reported one or more comorbidities, and 1,262 (59.4%) had a BMI $\geq$ 25.0. Homeless status was reported among 227 (13.0%) individuals. The Chi-square independence test showed that homelessness status was not statistically significant between the first surge and second surge ($\chi 2 = 1.96$; df = 1; p=.16). The distribution of COVID positivity in ED settings between the two surges were statistically significant among race ($\chi 2 = 43.09$; df = 4; p<.01) and ethnicity ($\chi 2 = 22.15$; df = 2; p<.01) groups. BMI ($\chi 2 = 19.56$; df = 3; p<.01) and comorbidities ($\chi 2 = 49.47$; df = 3; p<.01) were also consistent with literature.

Conclusions: Our findings suggest ethnic and racial minorities are still disproportionately affected by COVID-19 based on the 2020-2021 and 2021-2022 holiday surges. Findings also support that those with higher BMI and multiple comorbidities place individuals at higher risk of seeking emergency care. Homelessness status was not statistically different between surges in ED settings. However other contributing factors such as access to testing sites were not included in this data that may be attributed to this finding. Further studies should evaluate the impact of community outreach focused on these higher risk populations and the impact on care utilization and outcomes.

No, authors do not have interests to disclose

301 A Multi-Agency Description of Whole Blood Administrations by Emergency Medical Services During 9-1-1 Responses

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Introduction: Treatment for out-of-hospital hemorrhagic shock has traditionally relied on administration of crystalloid solutions and rapid transport. Successful whole blood administration in military settings has led to adoption by some emergency medical services (EMS) agencies. However, little is known about the types of EMS agencies administering whole blood or the types of patients who receive whole blood from EMS.

Study Objective: To describe agency and patient characteristics among 9-1-1 encounters involving whole blood administration by EMS in 2021, using a large national dataset.

Methods: This retrospective cohort study evaluated all EMS patient care records from the 2021 ESO Data Collaborative public use dataset. All patient records with documented "whole blood" or "blood" administration from January 1, 2021 to December 31, 2021 were included. The analysis was limited to 9-1-1 responses. Evaluations of systolic blood pressure (SBP) were limited to records with at least two measurements documented. Descriptive statistics were calculated.

Results: In 2021, there were 8,296,774 EMS 9-1-1 responses included in the dataset. There were 445 unique EMS patient care records with documented whole blood administration during a 9-1-1 response, performed by 76 EMS agencies. Most agencies were classified as community, non-profit (n=40, 53%), followed by governmental, non-fire (n=15, 20%), fire department (n=9, 12%), private, non-hospital (n=7, 9%), and hospital (n=5, 6%). The median age of patients who received whole blood was 50 years (Interquartile range: 31 to 68 years). Almost two-thirds (n=287, 65%) were male. Most patients were White, not Hispanic/Latino(a) (n=257, 63%), followed by Black/African American, not Hispanic/Latino(a) (n=72, 18%), Hispanic/Latino(a) (n=67, 17%), and the remaining patients had their race/ethnicity categorized as Other, not Hispanic/Latino(a) (n=8, 2%). Half of included whole blood administrations occurred during trauma responses (n=223), 48% (n=212) occurred during medical responses, and 2% (n=10) occurred during responses classified as both trauma and medical. The most common impression for traumatic response was "Injury" (n=96) while the most common impression for medical response was "Gastrointestinal Hemorrhage" (n=85). The median change in SBP from the first to the last measurement was 9 mmHg (Interquartile range -7 to 85).

Conclusion: While infrequent, whole blood was administered by EMS nearly equally for medical and traumatic indications. Improvements in systolic blood pressure were present when whole blood was administered lending support for use of this procedure, though future work is needed to study patient outcomes after hospital arrival.

No, authors do not have interests to disclose

302 Data or Dogma: Initial Potassium Levels in Patients Presenting to the Emergency Department in Diabetic Ketoacidosis

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Study Objectives: It is widely taught that patients presenting to the emergency department with diabetic ketoacidosis (DKA) have insulin therapy held until a serum potassium (K+) level can be obtained. This is based on literature suggesting a 4-5% rate of hypokalemia at presentation in DKA patients, and the theoretic risk that initiating treatment without repletion and supplementation could lead to significant morbidity or mortality especially from dysrhythmia. However, there is scant literature to support this concern regarding initial presentation though the need close monitoring of potassium and repletion during treatment is supported. Our objective was to determine the number of patients with an initial presentation of hypokalemia and DKA in our large urban-community teaching hospital.

Methods: We performed a retrospective chart review of patients presenting to the ED from January 1st 2019 to December 31st 2021, with a diagnosis of DKA, using deidentified data from our electronic medical record. DKA was searched for using ICD-10 codes, and identified charts were further reviewed for presence of an ED diagnosis of DKA based on serum glucose >200 mg/dl and bicarbonate < 18 mmol/L, anion gap >15, venous pH <7.33, or serum beta-hydroybuterate positive. Initial K+ levels were obtained, and charts were reviewed for EKG findings and evidence of arrhythmia. Demographic information was also obtained. Abstracted data was reviewed by a second author in 10% of charts to ensure accuracy.

Results: 540 patients were identified; of these 397 were confirmed to have DKA. Of those patients 6 had a potassium of <3.5 (1.5%), no patient had an initial K less than 3. Borderline K levels of 3.8-3.5 were found in 13 more patients. No patients had significant dysrhythmias. The most common EKG finding in patients with low K or borderline was normal sinus rhythm, followed by sinus tachycardia. Hemolysis was present in 170 (43%) of these initial values; 2 repeat K levels were less <3.5.

Conclusions: Our data suggests that significant hypoglycemia on presentation in patients with DKA is rare. While it is rare that insulin therapy must be initiated immediately on arrival, there can be delays in lab results due to process issues, hemolysis, and error. Given that hypokalemia on presentation appears to be quite rare, insulin treatment should not be held solely based on pending K+ levels. We are continuing to gather this data, and plan to have 5 years to report; we also plan to expand to multiple sites.

No, authors do not have interests to disclose

303 Improving Obstetrical Trauma Care Using a Standardized Protocol

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Study Objectives: Timely evaluation of a pregnant woman experiencing trauma has significant implications. To optimize trauma care for obstetrical patients, our Level I Trauma Center at Doctors Hospital at Renaissance initiated a Standard Operating Procedure (SOP) which puts an Obstetrician/Gynecologist (OBGYN) at bedside within 15 minutes of arrival. This involves calling an "OB Trauma Alert" and arranging expedited travel of the OBGYN Hospitalist from the Women's Hospital to the main hospital where most trauma patients in the Rio Grande Valley are brought. We performed a quality improvement initiative to evaluate operational compliance.

Methods: The IRB deemed this quality improvement project to be non-regulated research. Therefore, we reviewed obstetrical trauma admissions and subsequent deliveries of pregnant women >20 weeks presenting within 2 years before SOP implementation through 11 months after. We compared compliance of having an OBGYN at the bedside within 15 minutes, with target of 90% for the final post-SOP period.

Results: There were 173 obstetrical trauma admissions for the 2 years prior to SOP implementation, 53 during the first 6 months, and 25 during the last 5 months. Prior to SOP implementation, 1.2% of admissions had documentation of an OBGYN at bedside within 15 minutes and 6.4% had documentation of external fetal monitoring in place within 15 minutes, compared to 71.7% and 77.4% during 6-month peri-SOP, and 96% and 40% during the post-SOP period, respectively.

Conclusions: Optimal OB trauma care requires strategic coordination of getting both trauma and OBGYN providers at bedside in a timely manner. Operational compliance increased 94.8% the first 11 months after initiating this SOP at our facility. Although this practice change underscores the practicality of implementing a standardized procedure for getting an OBGYN at bedside within 15 minutes, additional focus should be on specific evaluation and management criteria.

No, authors do not have interests to disclose

304 Oral VTS-Aspirin/Ketamine Versus Oral Ketamine for Emergency Department Patients With Acute Musculoskeletal Pain

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Study Objective: The purpose of this study is to investigate if an orally administered combination of VTS-Aspirin™ and ketamine will provide better analgesia than a ketamine alone in adult patients presenting to the emergency department (ED) with acute musculoskeletal pain.

Methods: We conducted a prospective, randomized, open-label trial of ED patients aged 18 and older presenting with moderate to severe acute musculoskeletal pain as defined by an 11-point numeric rating scale (NRS) with an initial score of ≥5. Patients were randomized to receive either 324 mg of VTS-Aspirin and 0.5 mg/kg of oral ketamine (AOK) that is directly swallowed or 0.5 mg/kg of oral ketamine (OK) alone that is swished first and then swallowed. Patients were assessed at baseline, 30, 60, 90, and 120 minutes. The primary outcome was a difference in pain scores between the two groups at 60 minutes post-administration. Secondary outcomes included adverse events and the need for rescue analgesia. Power analyses indicated the need for 60 patients (30 in each group). The study is registered with www.clinicaltrials.gov; ID: NCT04860804.

Results: We enrolled 60 patients in the study (30 per group). The difference in mean pain scores at 60 minutes between the AOK and OK groups was 2.6 [95% CI: 1.38 - 3.77] showing a lower mean pain score in the OK group. At 60 minutes, the AOK group had a change in mean pain score from 8.4 to 6.3 (difference 2.1; 95% CI: 1.35 - 3.00). The OK group had a change in mean pain score from 7.8 to 3.7 (difference 4.1, 95% CI: 3.25 -4.90). No clinically concerning changes in vital signs were observed. No serious adverse events occurred in either group. The most commonly reported adverse effects were dizziness and fatigue. None of the participants required rescue analgesia at 60 minutes post-medications administration.

Conclusion: The administration of an oral combination of VTS-Aspirin ™ and ketamine resulted in less analgesia compared to oral ketamine alone, for the short-term treatment of moderate to severe acute musculoskeletal pain in the ED.

No, authors do not have interests to disclose

305 Managing Low and Intermediate Risk Transient Ischemic Attacks in the Time of a Pandemic

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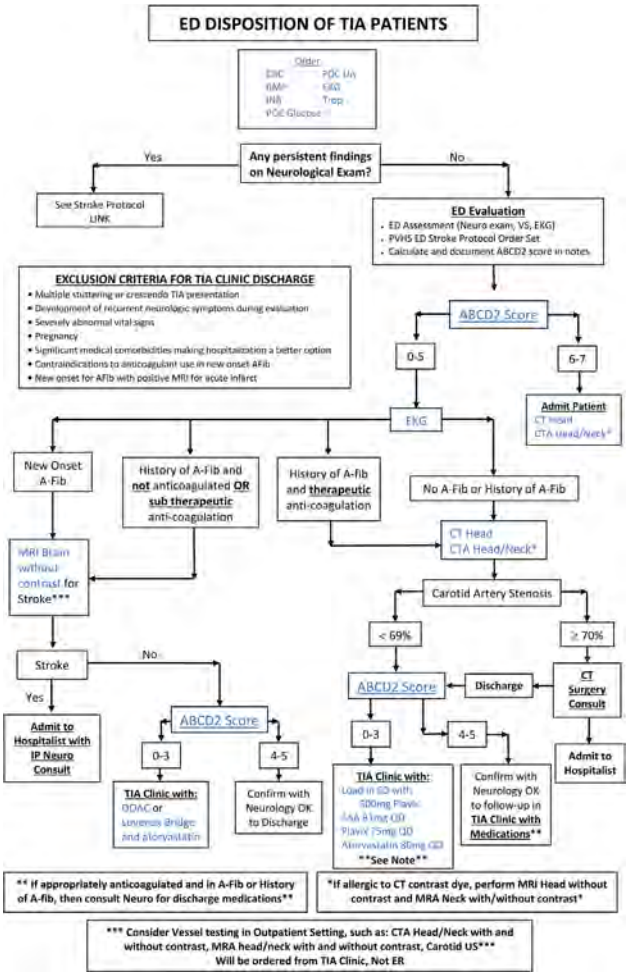
Background: Transient Ischemic Attacks (TIA) are both a harbinger of acute ischemic stroke and warrant urgent evaluation and management to reduce stroke risk. Recently, there has been increasing acceptance to evaluate low-risk (ABCD2 score 0-3) patients in an outpatient setting, but there is limited data on management of intermediate (ABCD2 score 4-5) risk patients. We hypothesized that intermediate risk TIA patients being treated according to protocolized medical management and diagnostic testing would have similar clinic follow-up and re- admission rates to low-risk patients.

Methods: An interdisciplinary team developed a standardized emergency department (ED) TIA protocol using ABCD2 scores, vascular/brain imaging, and neurology consultation to identify low and intermediate risk patients safe for discharge (DC) to the outpatient neurology TIA Clinic. Providers were encouraged to start patients on 7 days of dual anti-platelet therapy (Aspirin 81 mg, Plavix 75mg) and high dose statin (Atorvastatin 80 mg) unless contraindicated. A retrospective review of all patient records with a TIA Clinic referral order was performed to determine the number of days from ED discharge to clinic follow-up while trending 30-day readmission rates to any of our facilities during calendar year 2021. The same datapoints were reviewed and compared using Mann-Whitney U, SPSS version 22 for both low and intermediate risk patient populations for the same time interval.

Results: Following the January 2021 expansion of ABCD2 score criteria from 0 to 5, there were 324 total patients referred to the TIA Clinic. There were 198 low risk patients with ABCD2 scores from 0-3, 78% were seen in clinic, and 22% did not schedule an appointment. There were 126 intermediate risk patients with scores from 4-5, 69% were seen in clinic, and 31% did not schedule an appointment. There was no difference in outpatient follow up rates between low and intermediate groups (p value of 0.616). Only 1% of all referred patients were re-admitted and there was no difference in readmission rates between low and intermediate risk groups. None of the readmissions had acute infarcts on MRI.

Conclusion: Our multidisciplinary team created a novel emergency-based TIA evaluation protocol with close TIA Clinic follow up which allowed us to risk stratify both low and intermediate risk patients who could be managed in an outpatient setting. There was no significant difference in readmission rates while achieving similar rates of follow up for both low and intermediate risk patients. And with dwindling bed availability during the COVID pandemic, avoiding hospital admission could preserve precious bed space.



No, authors do not have interests to disclose

306 A Rapid Head CT Scan Protocol for Elderly Stable Patients Improves Time to Intracranial Hemorrhage Diagnosis

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Background: Minor head trauma is common in elderly patients. Intracranial hemorrhage (ICH) may present initially with minimal findings. Rapid diagnosis allows for rapid intervention with potentially better outcomes. In early 2020, a new ED protocol for all stable acute minor head trauma patients was instituted across two urban ED with the same MD staff. Patients meeting criteria were evaluated briefly by an attending MD who was paged to triage, and if otherwise stable and appropriate, had an expedited head CT performed.

Study Objectives: To evaluate benefit, as supported by decreased time to diagnosis of ICH, of a protocol to briefly evaluate and rapidly obtain a non-contrast cranial CT on stable patient ≥ 65 years of age with minor head trauma who did not meet criteria for a trauma activation/resuscitation.

Methods: Three years of all ED records of stable patients ≥ 65 years of age who presented with isolated head trauma at two urban EDs and were diagnosed with an ICH were reviewed. One ED was a level II trauma center (TC) and one was not a

trauma center. (NTC) Those who were triaged as acute resuscitations, had presenting complaints of injury > 24 hours, significant multisystem injury or did not have traumatic injury were excluded. The time period reviewed began approximately one year prior to intervention (several months different at the each hospital) and continued about two years post intervention. The cohort of stable patients who were diagnosed with a traumatic ICH (based on ICD coding) were compared to patients diagnosed with ICH whom presented prior to the initiation of the protocol and were subsequently triaged to an ED bay with evaluation proceeding in a usual manner.

Design: Setting: Two urban emergency departments (TC + NTC) with a combined volume of approximately 130,000 adult patients per year. Participants: Inclusion criteria were: All patients with a diagnosis of traumatic ICH ≥ 65 y.o whom: 1) underwent NCCT and were diagnosed with any intracranial bleed during the study period and 2) were not immediate trauma activations 3) Had acute trauma within 24 hours prior to presentation. Exclusion criteria were: 1) Patients who required a trauma activation on arrival prior to CT or had multisystem trauma, 2) Patients with a negative head CT for ICH and 3) Patients who presented with a chief complaint unrelated to head trauma. Patients on anticoagulants were excluded prior to the intervention at the TC but not post as they were no longer an automatic trauma activation.

Results: In time periods (12-14 months) prior to the initiation of the process, there were 18 patients who met criteria at the TC and 7 at the NTC. The median time to CT was 97 minutes for these stable patients at the TC and 111 min at the NTC. In the 24 months following the initiation of the protocol at the TC, there were 38 patients included at the TC. The protocol was correctly followed in 82%, however all who should have been in the protocol were included in the calculations. The median time to CT was 28 minutes. In the 13 months following the intervention at the NTC, 6 patients were included. The protocol was properly followed 83% of the time, but all were included in the calculations. The median time to CT was 17 minutes.

Conclusion: A dedicated process to rapidly assess elderly patients with minor head trauma and order and perform an expedited CT scan leads to a clinically significant improved time to diagnosis of potentially life threatening ICH.

No, authors do not have interests to disclose

307 Impact of Performing Pre-radiographic Urine Pregnancy Test on Time Delay from Triage to Radiograph Performance

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Background: Radiographs are commonly performed for ED patients with acute orthopedic injuries. There is concern regarding radiation exposure in females of child-bearing age with unknown pregnancy status.

Study Objective: To determine the impact of performing pre-radiograph urine pregnancy test [UPT] on duration of time from triage to radiograph performance [TTRP] in females with acute isolated extremity injury evaluated in the ED.

Methods: Review of consecutive ED cases of acute extremity injury in which plain film radiography was performed in patients ages 15 - 40 years comparing TTRP in females/UPT vs males, and females/no UPT.

Results: There was a total of 627 cases studied; consisting of 205 males, 178 females/UPT, and 244 females/no UPT. Median TTRP difference between groups was 15 minutes comparing females/UPT vs females/no UPT; and 24 minutes comparing females/UPT vs males. The percentage of those with TTRP <100 minutes was 62% in both males and 19 females/no UPT vs 46% in females/UPT [p = 0.002]. No pre-radiograph UPT test 20 performed [total cost $16,020] yielded a positive result.

Conclusion: TTRP is significantly longer in females who receive pre-radiograph UPT for acute extremity trauma. Generalized performance of pre-radiographic UPT screening for all females of child-bearing age rarely reveals pregnancy. Measures to expedite urine collection and processing, and utilizing protocols encouraging selectivity in UPT performance, are desirable to limit ED TTRP and associated health care costs.

No, authors do not have interests to disclose

308 A Geriatric Emergency Medicine Assessment Team Reduces Hospital Length of Stay through Faster Discharge to Subacute Rehabilitation

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Background: Patients aged 65 years of older are more likely to have longer hospital length of stays (LOS) than younger patients. Previously, we described the implementation of a Geriatric Emergency Medicine Assessment (GEMA) team that assesses older adults in the emergency department (ED) and provides appropriate interventions. In a pre-post study, we found that GEMA assessment was associated with a 25- hour reduction in hospital LOS.

Study Objectives: Using a case-control design on data collected from the first two years after implementation, we sought to quantify the reduction in hospital LOS and further elucidate the causes of this reduced time in the hospital.

Methods: Our GEMA team consists of an advance practice provider who screens ED patients ≥65 years old for functional decline. If patients screen positive, additional assessments are performed, which can trigger interventions such as occupational therapy (OT) assessment in the ED. Here, we performed a nested case- control study from a larger cohort of patients consisting of all patients ≥65 years of age who presented to the ED between October 2019 and December 2021 and who were subsequently admitted to the hospital (n=34,412). Patients who were admitted to the intensive care unit or to the observation unit were excluded. Cases were designated as those patients who underwent GEMA assessment. Controls were patients who were not assessed by the GEMA team and were matched to cases in a 1:4 ratio, with replacement, based on the criteria age, sex, race, and Estimated Severity Index (ESI). Data was obtained by retrospective chart review.

Results: There were 3,019 cases and 8,379 controls. The mean hospital LOS was 23 hours shorter for cases compared to controls (5.74 d vs 6.69 d; p<0.001). Cases were more likely to be discharged home after admission than to a subacute rehabilitation facility (SAR) (OR 1.22, 95% CI 1.08-1.33). For patients who were discharged home after admission, the mean difference in LOS was 11 h (4.64 d vs 5.10 d; p<0.001), and for patients who were discharged to a SAR after admission, the mean difference in LOS was 30 h (8.44 d vs 9.67 d; p=0.002). Patients who underwent OT assessment in the ED via the GEMA program and who were subsequently discharged to SAR after hospital admission had a reduction in LOS of 37 h (8.13 d vs 9.66 d; p=0.007).

Conclusion: GEMA patients had a shorter hospital LOS than matched controls and were more likely to be discharged home. The greatest difference in hospital LOS was found in patients who were discharged to a SAR after hospital admission and for whom GEMA assessment had resulted in OT assessment in the ED. This implies that the difference in hospital length of stay is primarily driven by two factors: 1) an increased number of patients who are able to be discharged home; and 2) the early involvement of OT in patients discharged to SAR. Additional contributors to the decreased LOS, such as a reduction in the incidence of delirium, remain to be investigated.

No, authors do not have interests to disclose

309 The Impact of a Brief Educational Intervention on Attending Physician Comfort During Sonographic Image Acquisition and Image Interpretation

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Study Objective: The purpose of this study is to measure the impact of a fifteen-minute, hands-on, educational intervention on attending physician comfort during image acquisition and image interpretation of the focused assessment with sonography in trauma (ie FAST exam).

Methods: This is a prospective, experimental, within-subjects design in which participants self-selected to participate, examining the impact of a fifteen-minute, hands-on, educational intervention on twenty emergency medicine attending physicians (N = 20) who practice at a tertiary academic facility. Participants provided the number of years they have been practicing, presence of ultrasound (US) training during residency, and a pre- intervention assessment (5-point Likert scale) on comfort level of image acquisition and comfort level of image interpretation. The participants then underwent a fifteen-minute, one-on-one, hands-on, educational workshop with an ultrasound trained faculty member. The workshop consisted of description and demonstration of the proper technique for each sonographic window that make up the FAST exam.

Participants were then asked to correctly obtain and identify key structures on a live model in all four windows. The participants then completed a post-intervention assessment.

Results: The study group consisted of twenty participants (N = 20) with 75% (nUS = 15) reporting US training during residency. Participants had a mean of 9 years

as an attending physician (SD = 8.54). All participants with fewer than ten years of experience had US training during residency as compared to 17% amongst those with more than ten years of experience. A paired-samples t-test was used to determine if there was a statistically significant difference in the scores reported by participants for image acquisition and image interpretation. The educational intervention resulted in a statistically significant increase in scores for both image acquisition, M = 0.650, 95% CI [0.999, 0.301], t(19) = 3.901, p < .001, d = 0.87 and interpretation, M = 0.400, 95% CI [0.719, 0.081], t(19) = 2.629, p = .017, d = 0.59. Additionally, two linear regressions were run to understand the effect of years of training on improvement of scores for image acquisition and interpretation. The prediction equation for image acquisition was: improvement acquisition score = 0.238 + (0.046 x years of experience). Years of experience significantly predicted increased impact of the educational intervention on image acquisition, F(1, 18) = 6.76, p = .018, accounting for 27.3% of the variation in performance differences with a medium size effect (adjusted R2 = 23.3%). The linear regression to determine if years of experience significantly predicted gains in image interpretation was not significant with p = .25.

Conclusion: Ultrasonography consists of two distinct components: image acquisition and image interpretation. This study found a statistically significant increase in scores after a brief educational intervention with further analysis demonstrating that more experienced attendings had greater benefit in image acquisition while image interpretation was similar to their less experienced counterparts. This may be due to a lack of integration during residency or differences in practice patterns. Emergency departments may consider incorporating brief, regularly occurring, hands-on training sessions to maintain the image acquisition skillset of practicing emergency physicians.

No, authors do not have interests to disclose

310 Emergency Department Oral Anticoagulation Prescribing Practices for Acute Atrial Fibrillation: Pre-Implementation of an Electronic Clinical Decision Support Tool

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Study Objectives: Atrial fibrillation (AF) is the most common arrhythmia; and often, first diagnosed in the emergency department (ED). AF increases the risk of stroke, which can be reduced by 64% if prescribed anticoagulation (OAC) in appropriate at-risk patients. An ED evaluation is a teaching moment that can change the trajectory of care for patients, however, stroke prophylaxis has not been well-appreciated in the ED. The ED is a prime target for initiating stroke prophylaxis with the use of clinical decision support tools to guide shared-decision making. To assess the pre-implementation environment, we examined the management and prescribing practices for ED patients with new-onset AF.

Methods: This was a retrospective chart review study utilizing pre-implementation data from a step-wedge cluster-randomized clinical trial. Data collected is from two of three enrolled urban ED's—an academic tertiary care center and a community hospital. Using the electronic health record (EHR) research data warehouse, patients were selected if they had a primary diagnosis of AF or paroxysmal AF during an ED visit between January 2020 and January 2022 and age >17 years. Patients were excluded for history of valvular disease, pregnancy, large esophageal varices, thrombocytopenia, severe liver or kidney disease, new stroke identified in the ED, death during ED encounter, admitted to hospital, left against medical advice, non-OAC naïve in the year prior to ED visit, severe or uncontrolled bleeding, transferred from another hospital, major surgery within 72 hours of ED visit, and recent brain, eye or spinal cord injury. Data abstracted from the EHR included demographics, co-morbidities, medications, EKG, vital signs, and disposition. Five trained chart reviewers verified abstracted EHR data and manually collected data from the EHR to assess stroke risk, bleeding risk, and other factors that may be predictive in OAC prescription. We performed descriptive statistics. Associations between OAC prescribing by site and ED return were tested using the chi-squared test.

Results: Of the 1,378 who had a diagnosis of AF, 186 participants met the inclusion criteria (mean age 62, male n=115 (61.83%)). Of the included patients, 41.85% (n=77) were diagnosed with new-onset AF and 44.57% (n=82) were diagnosed with paroxysmal AF. Providers prescribed or adjusted stroke prophylaxis for 45.7% (n=85) of patients. There was not a significant difference in stroke prophylaxis prescribing between the two sites (p=0.25). Providers provided a specific reason for or against stroke prophylaxis, 63.24% (n=117); and 43.23% (n=86) cited use of a guideline or clinical risk score. Of the included participants, 18.92% (n=35) returned to the ED in the year following their initial visit; 17.2% (n=32) for recurrent AF and 1.6% (n=3) for a complication related to OAC. There was not a significant difference in ED return between patients who were prescribed an OAC and those who were not (p=0.47).

Conclusion: Of the patients seen in the ED for a diagnosis of AF or paroxysmal AF, the majority did not receive stroke prophylaxis. Although the majority of providers gave a reason for or against OAC, only a minority cited the use of a guideline or clinical risk score to decide if OAC was appropriate. An accessible and streamlined clinical decision support tool in the EHR, may increase adherence to guidelines and thereby improve long-term clinical outcomes for patients who need stroke prophylaxis.

No, authors do not have interests to disclose

311 Ultrasound-Guided Trigger Point Injections for the Treatment of Neck and Back Pain in the Emergency Department: A Randomized Trial

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Study Objective: Patients frequently present to the emergency department (ED) with back pain or neck pain. Although a number of medications are available for use in these patients, achieving adequate pain relief can be difficult. One technique that has been used for many years but has not been well-studied in the ED setting is the trigger point injection (TPI). We thus performed a randomized trial to compare ultrasound-guided TPI to standard medications — in particular, the combination of a non-steroidal anti-inflammatory drug (NSAID) and a muscle relaxant (MR).

Methods: We performed a single-center, open label, randomized controlled trial comparing ultrasound- guided TPIs to standard medications for adult ED patients with back or neck pain thought to be due to myofascial pain syndrome. Patients randomized to the TPI group received injections of bupivacaine 0.25% at each trigger point to a maximum of 2 mg/kg. We performed TPIs using direct ultrasound guidance to ensure safe and accurate injection in the muscle. Patients randomized to the standard treatment group received medications at the discretion of the treating physician. However, for our primary analysis, we compared only patients who received the combination of an NSAID and a MR to those who received an ultrasound-guided TPI. The primary outcome of this study was the reduction in mean 100 mm visual analog scale (VAS) pain score at the time of discharge in the TPI group as compared to the NSAID plus MR group. Secondarily, we compared groups with regards to the reduction in mean pain score at first reassessment (15-30 minutes after treatment), and the rate of rescue medication use.

Results: Between October 2017 and August 2019, we enrolled 207 patients, amongst whom 11 dropped out before data collection was complete leaving 196 patients for analysis — 96 in the standard medications group and 100 in the TPI group. Of the 96 patients in the standard medications group, 56 (58.3%) received the combination of an NSAID and a MR, and these patients were used for the primary analysis. At the time of ED disposition, patients in the TPI group had a mean reduction in their pain scores of 45.0 mm as compared to 49.9 mm in the NSAID plus MR group (difference: 4.9 [95% CI -3.0 to 12.7], p = 0.22). However, at the first reassessment, patients in the TPI group had greater pain reduction by 10.7 mm (95% CI 3.1 to 18.4) as compared to patients in the NSAID plus MR group. The rate of rescue therapy use was 45.0% in the TPI group compared to 62.5% in the NSAID plus MR group (difference: 17.5% [95% CI 4.4 to 36.2%]).

Conclusion: Among ED patients with neck or back pain, we found no difference in pain reduction at the time of ED disposition for patients who were randomized to the ultrasound-guided TPI group as compared to those who received an NSAID plus a MR. However, patients in the TPI group had greater pain reduction at the time of first reassessment and had lower rates of rescue therapy use.

No, authors do not have interests to disclose

312 Racial Differences in Adult Emergency Department Triage Assignment Across An Urban-Rural Health System

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Study Objective: Despite attempts to limit triage subjectivity through use of the emergency severity index (ESI) algorithm, it is possible for implicit or explicit bias to impact acuity assignment. Across our health system, ESI is assigned by trained emergency registered nurses (RNs). Documented demographic characteristics, such as race and ethnicity, are often based upon perception rather than direct patient query.

We sought to assess the impact of perceived race on emergency department (ED) ESI score assigned at triage across our 9- ED health system. We hypothesized that those perceived as non-White would be more likely to receive lower acuity ESI scores, independent of objective measures of illness severity (heart rate, respiratory rate, blood pressure, and oxygen saturation) and that this effect would be more pronounced in rural (n=6) vs. urban (n=3) sites.

Methods: We performed a retrospective analysis of de-identified data extracted from the electronic health record. All encounters from adult patients presenting to system EDs with one of the 10 most common chief complaints (excluding psychiatric complaints) were included. Multivariable ordinal logistic regression was used to assess the association between perceived race and ESI score assigned by the triage RN. We adjusted for age, sex, interpreter use, payor type, mode of arrival (self vs. ambulance), triage vital signs, chief complaint, and measures of ED busyness. In secondary analyses, results were stratified by chief complaint and we investigated effect modification by ED locale (urban vs. rural) using a multiplicative interaction term. Results are presented as odds ratios (OR) and associated 95% confidence intervals (CI).

Results: Data from 301,050 patient encounters were analyzed. Non-White patients comprised 4.8% of visits (n=14,488) [2.2% (n=6,772) Black, 1.1% (n=3,374) American Indian/Alaska Native/Hawaiian/Pacific Islander/Asian, 1.4% (n=4,342) Multi-racial/Other]. In fully-adjusted analyses, non-White patients had significantly greater odds of receiving lower acuity ESI scores compared to White patients (OR 1.08, 95% CI: 1.01-1.17 for American Indian/Alaska Native/Hawaiian/Pacific Islander/Asian; OR 1.15, 95% CI: 1.08-1.23 for Multi-racial/Other; OR 1.35, 95% CI: 1.28-1.43 for Black, ref: White). Differences in ESI scores (Black vs. White) were most pronounced for the chief complaints of: headache (OR 1.91, 95% CI: 1.57-2.31), dizziness (OR 1.85, 95% CI: 1.39-2.44), and shortness of breath (OR 1.54, 95% CI: 1.34-1.77). No differences (Black vs. White) were noted for those with chest pain (OR 0.88, 95% CI: 0.75-1.02), a concern with a more protocolized work-up. Differences in ESI scores across perceived race categories were smaller at rural EDs compared to urban EDs.

Conclusion: This study provides evidence of systematic differences in ESI assignment across perceived racial groups, reflecting possible implicit or explicit biases rather than true differences in illness severity. Future research should explore how such differences affect patient experiences and outcomes, as well as the effect of ED locale and concordance between perceived and self-assigned race, which was not not evaluated here.

No, authors do not have interests to disclose

313 Aging in Illinois Prisons in the Time of COVID-19

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Study Objective: In the U.S., the population of older adults in prison has tripled since 1990, leading to the "gray wave" aging crisis, overwhelming a system that has historically been overcrowded and underprepared. During the COVID-19 pandemic infection rates in prisons across the country significantly outnumbered the general population. This study aimed to discern whether there was an appreciable rise in death rates between 2020 and 2019 among older, incarcerated individuals.

Methods: Publicly available Illinois Department of Corrections data sets were used to assess mortality rates overall, age, sex, race and COVID specific mortality between 2019 and 2020.

Results: Study findings showed that overall, the mortality rates in IL prisons increased from 2 deaths per 1000 inmates to 6 per 1000 inmates from 2019 to 2020. The risk of dying for an older prisoner (age >55 years old) compared to younger (<55 years old) was 13.45, (95% CI is 9.71-18.63 p<.001). The relative risk ratio of dying while infected by COVID-19 for older prisoners compared to younger is 1.74 (CI 1.07-2.84. p=.03). The relative risk ratio for older inmates with COVID related death is 23.4 (CI 13.0-42.2, p<.001). In conclusion, within IL prisons, between 2019 and 2020 there was a substantial increase in deaths in prison, with older adults making up the majority of those dying. Almost half of those who died, died while testing positive for COVID-19.

Conclusion: Based off this data, we advocate for implementing improved COVID-19 mitigation strategies across detention centers as well as accelerated release and community re-entry in order to protect this vulnerable population from potential infection and death. The issues of mass incarceration across the US have been exacerbated by the pandemic and have highlighted the need for justice reform and promotion of health equity.

No, authors do not have interests to disclose

314 Opportunities to Optimize Implementation of an Emergency Department Acute Heart Failure Risk Tool: A Mixed-Method Study of Physician Openness to Clinical Decision Support

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Study Objectives: Emergency department (ED) patients presenting with acute heart failure (AHF) are commonly admitted to the hospital, though a significant subset are at relatively low risk for adverse outcomes. We recently developed a novel machine learning (ML)-based AHF risk tool that predicts risk of 30-day serious adverse events. Successful implementation hinges upon physician acceptance of the tool and careful integration into existing workflows. Our objectives are to 1) understand ED physicians' hesitations towards use of an AHF risk prediction tool; 2) identify opportunities to optimize implementation and integration into workflows; and 3) probe physicians on use of a ML-based model in clinical practice.

Methods: Using a mixed-methods approach, we conducted semi-structured interviews (n=8) and surveyed (n=107) ED providers across three hospital-based EDs. We used a list of key issues and concepts to develop a semi-structured interview guide with open-ended questions and recruited interview participants using snowball sampling. Based on the interview responses, we developed a quantitative structured survey with these key domains: use of decision support in the ED, challenges related to risk prediction for patients with AHF, specific areas where decision support is needed, and hesitations with use of ML-based models. The survey was electronically sent to all practicing ED physicians at the study sites to increase the representation of physician opinions using an opt-in approach. We used descriptive statistics to summarize survey data.

Results: Participants varied in demographic characteristics, tenure, and involvement in operational, administrative, and research activities. The survey response rate was 60%. Prominent themes from interviews and surveys included the need for risk prediction and decision support to be targeted (venue of care guidance specifically for the more ambiguous moderate risk patients), timely (80% of survey respondents agreed or strongly agreed that risk estimates should be presented at the time of ED disposition decision-making), and safe (highly sensitive to elevated risk). Over 96% of providers agreed or strongly agreed that the tool must be user-friendly and be seamlessly integrated into workflows with minimal false alerts or extra clicks. We found 80% of providers agreed or strongly agreed that personalized disposition recommendations would be useful, 96% agreed or strongly agreed that having a tailored care plan for discharged patients would be useful, and 61% agreed or strongly agreed that decision support on ED medical management (eg, diuretic dosing) would be useful. In addition, 70% agreed or strongly agreed on the need for education on how the risk tool works prior to use and 88% agreed or strongly agreed on the need for feedback on patient outcomes after tool use. Only 5% of providers disagreed or strongly disagreed that they would feel comfortable using a ML-based model if they received education prior to implementation and the predictions were accurate.

Conclusions: Clinician-reported interest in targeted, timely, and user-friendly clinical decision support to risk- stratify AHF patients will guide the implementation of ML-based risk prediction tools for ED patients with AHF.

No, authors do not have interests to disclose

315 Coagulopathies and Mortality in Patients With Traumatic Subarachnoid Hemorrhage

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Study Objectives: Identification of clinical and non-clinical characteristics that might determine outcomes of patients with traumatic subarachnoid hemorrhage (tSAH) has the potential to enable risk stratification and treatment algorithms for these patients in the emergency department (ED). This study evaluates laboratory characteristics of patients admitted from the ED with tSAH to determine if they had laboratory abnormalities associated with co-morbid neurological injuries (including presence of any of the following: cerebral contusions, cerebral edema, intracerebral hemorrhage, intraventricular hemorrhage, subdural hemorrhage, epidural hemorrhage, skull fracture, spinal fractures spinal cord compression) and if those abnormalities were associated with clinical outcomes.

Methods: IRB-approved, retrospective analysis of patients admitted to a rural, academic tertiary referral Level 1 trauma center in a large health system between 2007 and 2017 with tSAH. Data included: demographics, initial evaluation, laboratory, and clinical outcome data collected.

Results: Among convenience sample of 211 patients diagnosed with tSAH, 131 (62%) laboratory data. Approximately 2/3 were female (63%), median age was 79 years and most common mechanism of injury was fall from standing (51%), followed by MVC (15%) and fall down steps (13%). History of aspirin use was common (47%), and use of other antiplatelet agents and use of anticoagulants was 11% and 13%, respectively). Subjects who experienced elevated INR (1.7 vs. 1.1), elevated PT (19.5 vs. 14 seconds) low platelets (119 vs. 201 K/uL) within 24 hours of admission, and those who experienced an elevated INR at any point during their hospital admission had higher in-hospital mortality compared to those who survived. Of the 131 patients, 82 (63%) experienced co-morbid neurological injuries. A larger proportion of patients with co- morbid neurological injuries had an INR > 1.4 during their stay compared to patients with non-comorbid neurologic injuries (26% vs 8%). Rates of ICU stay and in-hospital mortality were not associated with differences in hemoglobin or hematocrit levels within 24 hours of admission.

Conclusion: In this study, patients with tSAH and associated coagulopathies identified within 24 hours of hospital admission or during their hospitalization had higher in-hospital mortality. Additional investigation into the role of coagulopathies and lab abnormalities in patients with tSAH might help to risk stratify patients for treatment and disposition decisions.

No, authors do not have interests to disclose

316 Gender and the State of Professionalism Between Physicians and Nurses in the Emergency Department

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Study Objective: Emergency medicine (EM) physicians and nurses work together to take care of patients in a high-risk environment. Prior studies have shown that there is room for improvement in this interprofessional relationship and that there are gender-based disparities in professionalism between nursing and physicians. We sought to assess the current state of professionalism between nurses and physicians in an academic, county emergency department (ED) with a focus on gender-based disparities.

Study Design/Methods: An online, anonymous survey was sent to all nurses, residents, and attendings that worked in a large county, academic ED. An expert panel of attendings, residents, and nurses developed the survey based on two previously published surveys assessing gender issues in the ED and inter-departmental professionalism. The survey was administered using Qualtrics over a two-month period, and the data was analyzed using one-way Analysis of Variance (ANOVA).

Results/Findings: A total of 104 respondents completed the survey, with response rates of 55%, 56% and 53% for residents, attendings and nurses, respectively. A total of 24 residents, 25 attendings and 55 nurses completed the survey. Overall, the data demonstrated that female residents and attendings reported more gender-based discrimination (p=0.002), more often being mistaken as a non-clinician (p=0.039), and having gender-based discrimination diminish their job satisfaction (p=0.015), and personal well-being (p=0.037). In addition, female physicians reported more often that gender-based discrimination increased their personal risk of burn-out (p=0.002) and their sense of self-doubt (p=0.003). Compared to male attendings, female attendings reported more often having experienced being dismissed (p=0.04), rudeness (p=0.03), issues with procurement of supplies (p=0.047), being mistaken for a non-physician (p<0.001), having requests/orders ignored (p=0.05), having gender-based discrimination reduce their job satisfaction (p=0.015) and sense of personal well-being (p=0.010). Compared to male residents, female residents reported more often being dismissed (p=0.038), experiencing gender-based discrimination (p=0.002), being mistaken for a non- physician (p=0.048), having requests/orders ignored (p=0.045), and feeling less trusted (p=0.001). Female residents also reported that gender-based discrimination decreased their job satisfaction (p=0.007), personal well-being (p=0.029) and increased their personal risk of burn-out (p=0.004) and self-doubt (p=0.019). For nursing, the only area where there was a statistically significant difference was that female nurses felt more self-doubt as a result of gender-based discrimination compared to their male colleagues (p=0.001).

Conclusion: In this ED, women reported experiencing more gender-based mistreatment when compared to their male cohort. For female physicians, this affected their sense of well-being and for female residents and nurses it increased their self-doubt. Further studies are needed to identify interventions that reduce the incidence of gender-based discrimination that women experience in the ED.

No, authors do not have interests to disclose

317 Implementation of a Stroke Response Team at a Pediatric Emergency Department

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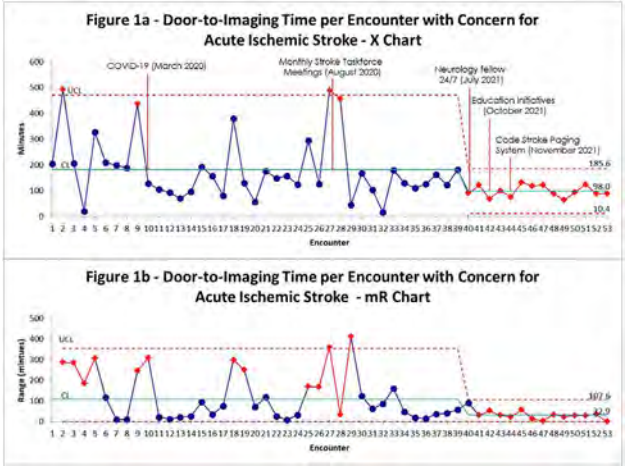
Study Objectives: Acute ischemic stroke (AIS) is an important cause of morbidity and mortality in children. Timely usage of hyperacute therapies, such as intravenous tissue plasminogen activator (IV-tPA) and mechanical thrombectomy, appear to be safe and effective in children. Despite this, early recognition and diagnosis of pediatric AIS within the therapeutic window for hyperacute therapies remains a challenge. Our objective is to improve timely diagnosis of AIS at our pediatric tertiary hospital emergency department (ED) through the implementation of an interdisciplinary stroke alert team and improved coordination of care.

Study Design/Methods: A 36-month quality improvement initiative was implemented at our urban-based pediatric tertiary hospital ED. Our primary outcome measure was improvement of median door-to-imaging time for children with suspected AIS. Our secondary outcome measure was percentage of patients with clinical concern for AIS triaged at emergency severity index (ESI) level 1 or 2. A series of plan-do-study-act cycles were conducted over our study period. Our interventions included: educational resources to nurses and physicians (October 2021) and the introduction of a stroke alert paging system to key stakeholders (November 2021). Data were collected by chart review for November 2019 through June 2021 (baseline), and July 2021 through November 2022 (intervention period). Preliminary post-intervention data was obtained from July 2021 to April 2022. Patients aged 0 to 18 years with acute onset focal neurological deficit and clinical concern for AIS that had neuroimaging performed in the ED were included in our baseline and post-intervention analyses. Patients received either computerized tomography (CT) and CT angiography (CTA), or magnetic resonance imaging/angiography (MRI/MRA) as initial neuroimaging depending on availability of either imaging modality. Patients who had symptom onset longer than 24 hours, traumatic injury, or known metabolic disorder predisposing to brain injury were excluded. Statistical process control (SPC) charts were used to detect improvement. Achievable benchmarks of care were calculated for each measure. Testing for significance was performed using two sample t-test assuming unequal variances for our primary outcome measure and chi-square analysis for our secondary outcome measure.

Results/Findings: A total of 39 and 14 pre- and post-intervention encounters, respectively, were seen during the study period. Three patients had confirmed AIS on neuroimaging; none received hyperacute therapies. Median door-to- imaging time was reduced post-intervention (157 minutes to 92 minutes, p<0.01). Patients triaged at ESI level 1 or 2 increased from 67% to 79% (p=0.41). Both CT/CTA and MRI/MRA as initial neuroimaging saw a decrease in median door-to-imaging time (139 minutes to 109 minutes CT/CTA, p=0.01; 173 minutes to 89 minutes MRI/MRA, p<0.01).

Conclusions: Stroke alert teams are beneficial for timely diagnosis, coordination of care, and support in ensuring a higher proportion of children with AIS are eligible for hyperacute therapies by decreasing door-to-imaging time.



No, authors do not have interests to disclose

318 How Are Research Associate Programs Structured? The First Updated, Cross-sectional Survey of Programs Across the US and Canada

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Study Objective: Residencies must engage in scholarly activity and publish research, and many GME programs have developed research associate programs (RAPs) to aid with clinical research. These programs also allow students to gain clinical and research experience. No prior survey describes the characteristics of these programs and their growth across Canada and the US. This information is essential to help programs establish this method of increasing clinical research opportunities within GME.

Methods: Programs were identified through Medline, direct familiarity, comprehensive online search, and chain-referral sampling. Questions were selected by review of the literature and a convenient expert panel. Program leaders were surveyed from 2014 to 2022. Some questions were expanded in 2019. The topics covered included RAP leadership, funding, types of research, training, activities performed by associates, university affiliation, and the selection process. Results were analyzed using descriptive statistics.

Results: 42 of 49 RAPs responded (85.7%) with a mean of 24 (SD = 16) associates in each program and a range of 5-85 associates. Most RAPs were one year or less. Associates worked on investigator-initiated projects (33/42, 78.6%), prospective research (35/42 83.3%), retrospective reviews (26/42, 61.9%), and informed consent (41/42, 97.6%). Some also involved associates with data abstraction, protocol development, abstract writing, manuscript preparation, and quality improvement. Many required college course enrollment (23/42, 54.8%). Training included patient confidentiality (HIPAA) and research ethics, and almost all reported satisfactory, high, or very high acceptance at their institution (40/42, 95%.

Conclusions: In a survey across Canada and the US with a high response rate, research associate programs are found to be a growing presence in graduate medical education. Often led by a physician director, they typically are 10 months in duration and provide informed consent and other training. This survey also provides insight for those who are administering RAPs or who plan to start one in the future.

No, authors do not have interests to disclose

319 The Association Between COVID-19 and Telehealth Use in U.S. Emergency Departments

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Study Objectives: Telehealth capacity may be an important component of the infrastructure for pandemic response in the US health care system. Our objective was to examine changes in the use of telehealth by US emergency departments (ED) during the COVID-19 pandemic, and to determine whether local prevalence of COVID-19 was associated with increased likelihood of ED telehealth use in 2020.

Methods: We used data from the National ED Inventory (NEDI)-USA, 2016-2020 that includes data on ED characteristics and telehealth use for all US EDs, including receipt of telehealth services from an external provider for patients in thier ED, use of telehealth technology internaly for their own ED clinicians caring for patients in thier own ED, provision of care via telehealth to patients located in other EDs, and provision of care via telehealth to their own patients located remotely. We used data from the Dartmouth Atlas for COVID-19 prevalence health care referral region (HRR). We used a linear regression model that included ED telehealth use from 2016-2019 to predict the proportion of EDs expected to use telehealth in 2020 and determined whether actual use in 2020 was significantly different from expected using a test of proportion. Among EDs not using telehealth in 2019, we used a logistic regression model to examine whether COVID-19 prevalence in the ED's HRR was significantly associated with odds of ED telehealth adoption in 2020, after accounting for ED volume, rural location, academic status, and whether ED was freestanding vs. hospital- based.

Results: Of the 5,245 EDs open in 2019 and 2020, 3,868 responded to the telehealth questions on the NEDI- USA survey in both years (74% response rate). Of these EDs, 2,977 (77%) used telehealth for one or more reasons; 2,759 (71%) reported receiving telehealth services from an external provider for patients in their ED, 702 (18%) reported using telehealth services internally for their own ED clinicians to care for patients in their own ED, 147 (4%) reported providing telehealth services externally to patients in other EDs and 118 (3%) reported providing care to their own patients located remotely using telehealth. Telehealth use by US EDs increased more than expected in 2020: from 58% in 2016, 61% in 2017, 65% in 2018, 67% in 2019 to 74% in 2020, significantly greater than the predicted 71% (p=0.004). Prevalence of COVID-19 in the ED's HRR was not significantly associated with odds of ED telehealth adoption in 2020 (Table).

Conclusion: Telehealth use by US EDs grew more than expected in 2020. This may have been motivated by pandemic-related infection transmission concerns and related policy changes. However, local prevalence of COVID-19 was not significantly associated with likelihood of telehealth adoption among those without preexisting infrastructure. Future pandemic responses may benefit from considering strategies to encourage technology adoption and innovation in areas most impacted.

Table. Factors associated with odds of telemedicine adoption in 2020 (n=3,868)

	Odds Ratio	95% Confidence Interval
Full 2020 prevalence of COVID-19 in ED's HRR (per 1,000 case increase)	1.01	0.96, 1.07
ED volume		
<10,000	0.96	0.68, 1.36
10,000-19,999	0.80	0.56, 1.13
20,000-39,999	1.04	0.73, 1.49
≥40,000	1.00 (referent)	
Rural location	0.64	0.47, 0.87
Freestanding ED	1.69	1.18, 2.42
Academic status	1.86	1.19, 2.89

Legend. ED Emergency Department; HRR healthcare referral region

No, authors do not have interests to disclose

320 Trends in Acute Care of Vaso-Occlusive Episodes in the Emergency Department Following the 2014 National Heart Lung Blood Institute Guidelines

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Background: Patients presenting to the Emergency Department (ED) with sickle cell disease (SCD) vaso-occlusive episodes (VOE) encounter variability in triage acuity level designation and pain management practices. Our study aims to describe national trends in Emergency Severity Index (ESI) level designation and the rate of narcotic administration for ED patients with SCD VOE. We additionally compare both of these variables before and after publication of the 2014 National Heart Lymph Blood Institute (NHLBI) guidelines for the management of patients with VOE.

Methods: This was a retrospective cross-sectional, secondary analysis of the National Hospital Ambulatory Medical Care Survey (NHAMCS) from the years 2009-2019. We included patients ≥18 years of age with ICD-9-CM and ICD-10-CM codes corresponding to a diagnosis of sickle cell pain crises. Outcomes were defined as ESI-level designation (dichotomized as high acuity [ESI 1or 2] and low acuity [ESI 3, 4 or 5]) and treatment with any opioid. Separate multivariable logistic regression models were used to identify variables associated with higher acuity and opioid administration.

Results: A total of 1,502,550 (0.115%) estimated ED visits met inclusion criteria for VOE. The rate of opioid administration for VOE increased by 9.4%(p<0.01) and designation to a high acuity level decreased by 2% following the publication of the 2014 NHLBI guidelines. Regression analysis identified the following factors as independent predictors of high acuity assignment: age 80 (OR 7.93, CI 1.05-59.62), NH-Black race (OR 7.03, CI 2.17-16.04), Hispanic ethnicity (OR 9.72, CI 5.43-17.40). Patients with Medicaid insurance (OR 0.2, CI 0.04-0.98) were less likely to be triaged to a higher acuity level. Reporting a high pain score (OR 0.09, CI 0.18-4.26) did not increase the odds of assignment to a higher ESI. Age 40-59 (OR 7.30, CI 1.12-47.48) and moderate pain (4-7) were the only independent predictor of opioid administration.

Conclusions and Global Health Implications: While opioid administration practices for VOE showed improvement over time, the ESI allocation and pain management still reflect disparities in care that are not congruent with best practices. Targeted quality initiatives are needed to address gaps in care of this patient population.

No, authors do not have interests to disclose

321 Not So Benign Paroxysmal Positional Vertigo in the Emergency Department

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Study Objectives: Benign paroxysmal positional vertigo (BPPV) is the most common cause of vertigo. Many affected patients have mild to moderate symptoms and are easily treated as outpatients. In others, BBPV can have a profound effect on function, independence, and quality of life. The purpose of this study is to determine hospital admission rates of patients with BPPV with a focus on diagnostics and treatment.

Methods: This was a retrospective cohort analysis of consecutive adult patients with an ED diagnosis of BPPV. Patients were seen at seven emergency departments (EDs) over an 8-month study period. Data collected included demographics, clinical features, diagnostic testing, and treatment. Patients discharged from the ED were compared to those admitted to the hospital. Chi-squared and t-tests were used to compare the two groups across key demographic and outcome variables. A random sample of 10% of the charts were reviewed to determine inter-rater reliability.

Results: A total of 394 adult ED patients met the inclusion criteria; 66 (16.8%) were admitted and 328 (83.2%) were discharged home. Admitted patients were less likely to have positional testing performed in the ED and were more likely to undergo computed tomography (CT) of the head (80.6% vs. 41.7%, $p < 0.001$). Vestibular suppressant drugs were given to 95.0% of all BPPV patients in the ED while canalith repositioning maneuvers were used in 3.6%. Patients were admitted because of difficulty with gait and balance (77.3%), persistent vomiting (19.7%), and/or waiting for magnetic resonance imaging (12.1%). Admitted patients were more likely to be male (50.0% vs 33.5%, $p < 0.001$), older (67.5 vs. 58.3 years, $p < 0.001$), non-Caucasian (13.9% vs 6.7%, p=0.048) and have more comorbidities (89.3% vs. 76.8%, p=0.023). The mean hospital length of stay was 3.1 +/- 2.9 days. Twenty-one (6.4%) of discharged patients returned to the ED within 14 days for recurrent symptoms. Reliability of data collection ($k = 0.88$) showed excellent agreement.

Conclusions: BPPV is a frequent entity in older adults and may have a protracted course and high risk of recurrence. Vestibular suppressant drugs such as meclizine are commonly prescribed and can be associated with significant adverse reactions. In the instances where positional testing is not feasible because of disorders of mobility or other comorbidities, ED patients are often subjected to unnecessary, expensive investigations regardless of age.

No, authors do not have interests to disclose

322 The Impact of the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Pandemic on Pediatric Emergency Department Encounters in a Major Metropolitan Area

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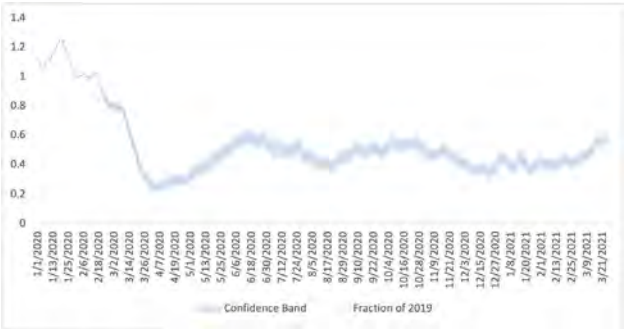
Study Objectives: The end of 2019 marked the emergence of the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) pandemic. A trend of health care avoidance has been noted in prior pandemics. However, prior studies have suggested that lower acuity patients may disproportionally be the ones avoiding emergency departments (ED). This study seeks to further describe pediatric health care-seeking behaviors during the COVID-19 pandemic.

Study Design/Methods: The objective of this study is to describe the changes in ED pediatric patient census, acuity, and hospitalizations in a single metropolitan area during the COVID-19 pandemic. The study was conducted as a descriptive, retrospective cross-sectional study of individual ED visits occurring before and during the COVID-19 pandemic in the Phoenix, Arizona metropolitan area of Maricopa County. Maricopa county contains 4.485 million people in a catchment area of 9,224 square miles supported by thirty-eight EDs. These include departments with adult and pediatric populations located in urban, suburban, and rural settings. Pre-pandemic there were 1,439,972 total ED visits reported in Maricopa County in 2019. Individual sites collected ED pediatric patient daily census, monthly ED pediatric patient acuity using the Emergency Severity Index (ESI 1-5), and monthly ED pediatric patient disposition (discharge versus admission). Pre- pandemic ED visits occurring from January 1st, 2019, through December 31st, 2019, were compared to ED visits occurring during the pandemic from January 1st, 2020, through March 31st, 2021. Shapiro-Wilk and the Kolmogorov Smirnov tests were used to assess distribution. The change in mean ED visits between 2019 and 2020 was compared using paired t-test. The change in pre-pandemic and pandemic ED volume was demonstrated using a 7-day moving average of proportions, with Wald method used for creation of 95% intervals for confidence bands. Comparison of patient disposition and acuity (ESI) between periods was performed using chi square tests.

Results/Findings: Twenty-one EDs within Maricopa County elected to participate in the study. The study enrolled 83.8% of the total pandemic ED encounters. The mean daily 2019 and 2020 pediatric encounters were 469 and 271 ($p<.001$), respectively. Pandemic pediatric visit volume went down to as low as 22.1% (95% CI 19.3%–26.0%) of pre-pandemic volume respectively and did not return to 2019 levels through early 2021 (Figure 1). The median pre- and pandemic pediatric ESI scores were 3 and 3, respectively. However, as compared to pre-pandemic, there were more ESI level 2 and 3 patient presentations and fewer level 4 and level 5 patients (p-value < 0.00001) during the pandemic. The pandemic also saw a relative increase in admissions as compared to pre-pandemic. The pre-pandemic pediatric median monthly admission percentage was 5.1% compared to median pandemic monthly admission percentage of 5.6% ($p < 0.01$).

Conclusion: Total ED encounters for pediatric patients were significantly reduced during the COVD-19 pandemic across a single metropolitan area. The reduction was most pronounced during the early pandemic but persisted through early 2021. However, there was also a relative increase in higher acuity presentations and admissions. The development of strategies for mitigating ED avoidance and addressing the distribution of patient care across the health care system will be important in future pandemics.



No, authors do not have interests to disclose

323 Phenobarbital Protocol for Alcohol Withdrawal Syndrome Reduces ICU Length of Stay in Trauma and Burn Patients

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Background: Alcohol withdrawal syndrome (AWS) has a high prevalence among the surgical trauma population. There is significant overlap between the physiologic responses to traumatic injury and abstinence from chronic alcohol use. Co-occurrence of AWS and trauma is associated with longer length of stay, increased need for mechanical ventilation (MV), and worse discharge disposition. Benzodiazepines have long been the standard agents for management of withdrawal symptoms. Benzodiazepine efficacy is limited by GABA receptor conformational changes and downregulation in patients with chronic alcohol use. Phenobarbital has been suggested as a superior agent for the management of AWS as it also acts on NMDA, AMPA, and kainite receptors modulating glutamate activity.

Study Objectives: Determine the safety and efficacy of a novel phenobarbital protocol for management of AWS in trauma and burn patients versus the current standard of care.

Methods: A single center mixed trauma-burn ICU developed and employed a protocol using phenobarbital as an adjunct to benzodiazepines in the management of moderate to severe AWS. A retrospective cohort study was performed to compare this phenobarbital protocol to the institution's traditional benzodiazepine-based protocol. Inclusion criteria included age $\geq$ 21 years, trauma or burn injury, moderate or higher withdrawal severity scores, and 6mg of benzodiazepine administration within 24 hours of presentation. The primary outcome was ICU length of stay. Secondary outcomes included rate of MV initiation after alcohol withdrawal therapy, ICU readmission and mortality.

Results: The study included 73 patients admitted to the unit between 2014 and 2020. 38 patients were treated with the benzodiazepine-based protocol and 35 patients were treated with the phenobarbital protocol. There were similar demographics between the experimental and control groups including age, male sex, prevalence of chronic lung disease, prevalence of cirrhosis, and history of alcohol withdrawal (Table 1). Disease states at admission were equivalent: traumatic injury, burn injury, Injury Severity Score, rib fractures, and MV at time of AWS treatment initiation (Table 1). Mean lorazepam administration was significantly reduced in the phenobarbital group (25.5mg vs 75.8mg; p=0.036). The experimental group received a mean phenobarbital loading dose of 6.5 ± 2.1 mg/kg and a mean total of 1460 ± 861 mg. There was no difference in the highest withdrawal severity scores between the groups (5.1 vs 5.1; p=0.905). ICU length of stay was significantly lower in the experimental group (5.4 days vs 8.3 days; p=0.041). Differences in need for MV after start of AWS treatment, ICU readmission, and mortality were not significant (Table 2).

Conclusion: A standardized protocol for the use of phenobarbital as an adjunct for management of AWS may be beneficial. Patients receiving phenobarbital were liberated from the ICU at a significantly faster rate. This difference likely translates to a significant reduction in health care costs. The similar rates of MV initiation after treatment suggest that the unit's phenobarbital protocol did not increase the risk of severe respiratory depression. Further prospective studies should be performed to evaluate for additional benefits of phenobarbital in the management of critically ill patients with AWS.

Table 1. Demographic Information

	Control Patients (n=38)	Phenobarbital Patients (n=35)	P value
Age, mean (SD)	51.2 (13.9)	50.7 (12.9)	0.874
Male, n (%)	29 (76.3)	32 (91.4)	0.116
Trauma, n (%)	26 (68.4)	29 (82.9)	0.232
Burn, n (%)	12 (31.6)	6 (17.1)	0.232
Injury Severity Score, mean (SD)	16.5 (10.5)	13.9 (8.2)	0.642
Lung Disease, n (%)	6 (15.8)	4 (11.4)	0.738
Cirrhosis, n (%)	2 (5.3)	2 (5.7)	1.00
Rib Fractures, n (%)	9 (23.7)	11 (31.4)	0.600
3 Consecutive Rib Fractures, n (%)	7 (18.4)	3 (8.6)	0.312
History of Alcohol Withdrawal, n (%)	13 (34.2)	16 (45.7)	0.347
Admission Weight, mean (SD)	77.5 (18.5)	81.8 (18.2)	0.327
Highest MAWS, mean (SD)	5.1 (1.5)	5.1 (1.7)	0.905
Mechanically Ventilated at Time of Alcohol Withdrawal Therapy Initiation, n (%)	14 (36.8)	13 (37.1)	1.00

Table 2. Patient Outcomes

	Control Patients (n=38)	Phenobarbital Patients (n=35)	P value
ICU Length of Stay, median (IQR)	8.3 (13.7)	5.4 (6.2)	0.041
Sepsis, n (%)	7 (18.4)	1 (2.9)	0.057
Pneumonia, n (%)	11 (28.9)	5 (14.3)	0.163
Mechanically Ventilated After Alcohol Withdrawal Therapy, n (%)	8 (21.1)	9 (25.7)	0.783
ICU Readmission, n (%)	1 (2.6)	3 (8.6)	0.344
Mortality	1 (2.6)	1 (2.9)	1.00

No, authors do not have interests to disclose

324 Effect of High-sensitivity Troponin on Emergency Department Length of Stay for Patients Evaluated for Acute Coronary Syndrome

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Study Objective: To estimate the effect of an emergency department (ED) acute coronary syndrome (ACS) pathway utilizing a high-sensitivity troponin as compared to a contemporary troponin on ED length of stay.

Study Design / Methods: We performed a quasi-experimental study using a before-after design at a single institution. The study cohort included adult patients, who had a cardiac troponin completed in the ED, and had either a chief complaint or an ICD-10 code for chest pain or acute coronary syndrome. Standardized medical record abstraction by trained emergency physician abstractors was then used to exclude patients with STEMI, traumatic chest pain, or a non-ACS diagnosis. Consecutive patients in the pre-intervention period (Dec 2017-Mar 2018) were evaluated using a 4th generation contemporary troponin incorporated into a HEART Score pathway with repeat troponins occurring every 3 hours. Patients in the post-intervention period (June 2020-Jan 2021) were evaluated using a 5th generation high-sensitivity troponin incorporated into a novel ACS evaluation pathway using repeat troponins at 1 hour and 3 hours depending on troponin values and subsequent delta troponins. Primary outcome was ED length of stay. For patients discharged from the ED, ED LOS was calculated as the time from arrival to departure from the ED. For patients admitted to the hospital, ED LOS was calculated as time from arrival to bed request order. All data management and statistical analyses will be performed with SAS Enterprise Guide, Version 7.1. Descriptive statistics will be calculated for all variables. Continuous data will be reported as medians with interquartile ranges and categorical variables as percentages with 95% confidence intervals (CIs). Multivariable regression was used to calculate the change in ED LOS while adjusting for type of troponin used, patient age (continuous variable), chief complaint, number of troponins measured, and ED HEART Score.

Results: 1298 patients were included in the study with 649 patients in each period. Patients in the high- sensitivity troponin period had lower composite HEART scores than patients in the contemporary troponin period (Low Risk: 68.6% vs 61.6%, Moderate Risk: 26.3% vs 32.4%, High Risk: 5.1% vs 6.0%; p=0.035). Patients were more likely to be discharged from the ED in the high-sensitivity troponin period (85.1% vs 70.7%; % difference 14.3%, 95% CI: 9.9-18.8%). Median length of stay for patients discharged from the ED was 282 minutes in the contemporary troponin period as compared to 192 minutes in the high-sensitivity troponin period (median difference 68 minutes, 95% CI: 46-90 min). Median length of stay for patients admitted from the ED was 170 minutes in the contemporary troponin period as compared to 152 minutes in the high-sensitivity troponin period (median difference 35 minutes, 95% CI: -14.7 to 85.2 minutes). Using multivariable logistic regression to control for age, sex, chief complaint (chest pain vs other), number of troponins collected, and composite HEART score (low, moderate, high), use of a high-sensitivity troponin decreased ED LOS by 54.2 minutes.

Conclusion: Implementation of a high-sensitivity troponin into an ED ACS evaluation pathway significantly decreased length of stay for adult patients presenting for symptoms concerning for acute coronary syndrome.

No, authors do not have interests to disclose

325 Bridging the Gap: Medical Interpreter Utilization Workshop to Improve Communication

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Background: Patients with Limited English proficiency (LEP) experience disparities and inequitable care due to the language barrier. A qualified medical interpreter (QMI) is required by law to communicate in their primary language, yet there are inconsistencies in utilization practices. Using interpretation services effectively is an integral part of establishing a therapeutic relationship, improving patient outcomes, and providing culturally competent care. However, many institutions lack a curriculum that equips learners with training for using a professional interpreter. Strategies that explore the experiential learning theory provide effective training modalities for teaching appropriate use of a QMI and address a gap in the curriculum. Our study aimed to develop a curriculum for students on using a QMI and assess its effect on their knowledge, skill, and confidence. Following the implementation of the curriculum, we compared their performance on the pre/post Faculty Observer Rating Scale (FORS) and their self-reported confidence level.

Methods: Using Kern's model of curriculum development, we created a 3-hour interactive workshop based on the experiential learning theory providing students with the knowledge and skills for working with a professional interpreter. We integrated a multimodal approach, including didactics, video demonstration, case-based discussion, and role-playing. Using the FORS, we assessed their performance during a pre and post-session patient encounter. Each student was observed taking a history from a bilingual standardized patient with a phone interpreter. We compared the mean pre and post-session confidence level and global score on FORS using Wilcoxon's signed-rank test.

Results: A total of 18 first-year medical students participated in the workshop. Students' global scores on the FORS post-session showed an average increase of 58.8%, with 88.9% of students meeting the goal of 10% improvement. There was a significant difference in students' confidence levels pre and post-intervention (95% CI: -2.0- -1.5, p-value<0.4), with the average confidence level increasing from 2.39 to 3.94 out of 5 possible points.

Conclusion: A comprehensive curriculum teaching learners how to work with interpreters can significantly improve performance. Demonstrating the skills in a controlled setting can help improve their confidence, consolidate instructional information, and form the foundation for integration into real-life patient encounters.

Key Words: interpreter, QMI, professional interpreter, limited English proficiency, medical education

No, authors do not have interests to disclose

326 Phenobarbital vs Benzodiazepines for Treatment of Alcohol Withdrawal in the Emergency Department: A Systematic Review and Meta-analysis

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Study Objectives: Perform a systematic review and, if appropriate, a meta-analysis of the literature base comparing phenobarbital (PB) to benzodiazepines (BZD) for the treatment of alcohol withdrawal syndrome (AWS) in the emergency department (ED), specifically considering safety profile and efficacy in terms of utilization, pharmacologic, and clinical outcomes.

Methods: In consultation with a research librarian, we queried three databases (PubMed, Embase, and Web of Science) from inception to May 2022. We also performed a manual citation review of included studies and searched clinicaltirals.gov for unpublished results. We included studies of human adults with AWS comparing treatment with a BZD alone to PB alone or in combination with BZD in the ED. Included studies defined AWS diagnosis by provider assessment or diagnostic codes. We included randomized controlled trials or cohort studies with an intervention and control group; studies without a BZD comparator were excluded. We excluded studies focused on populations with a primary non- AWS diagnosis and studies not published in English. We considered a variety of outcomes for review, organized into utilization, pharmacologic, and clinical outcomes. The primary outcomes for meta-analysis were the proportion of patients admitted to the intensive care unit (ICU), the proportion admitted to the hospital, the proportion of ED readmissions for those discharged, and the proportion of patients who experienced adverse events. We summarized dichotomous outcomes using relative risk (RR) and the 95% confidence interval around the summary estimate. Results were combined using random effects models according to the Dersimonian and Laird method. We did not combine effects if there were fewer than three studies which reported the outcome. We also report on the mean dose, measured in lorazepam equivalents, of GABA-agonist received by each group.

Results: We identified 94 abstracts through initial screening and retrieved 8 for full-text review. All 8 were included in the analysis for adverse events, 7 for hospital admission, 5 for ICU admission, and 3 for re-admission to the ED after discharge. Both reviewers independently agreed on all included studies; overall, agreement was substantial with Cohen's kappa for article selection at 0.76. The two earliest studies meeting inclusion criteria were double-blinded randomized controlled trials; all subsequent studies were retrospective cohort studies. Overall, 1,507 patients contributed data to this meta-analysis, comprising 2,012 treatment encounters for AWS. In general, the methodological quality of studies was low to moderate, risk of bias moderate to high, and statistical heterogeneity moderate. The RR of admission to the ICU for those treated with PB vs BZD was 0.92 (95% CI 0.54, 1.55). The RR of admission to the hospital for those treated with PB vs BZD was 0.98 (95% CI 0.89, 1.07). The RR of re- admission to the ED after discharge those treated with PB vs BZD was 0.82 (95% CI 0.5, 1.34) The RR of any adverse event for those treated with PB vs BZD was 1.1 (95% CI 0.78, 1.57). The mean dose (SD) of lorazepam equivalents for the BZD group was 10.7 (7.7) vs 30.7 (1.9) for PB groups.

Conclusions: The current literature base suggests that, compared to treatment with benzodiazepine alone, treatment with phenobarbital does not significantly reduce ICU admissions, hospital admissions, ED re-admissions, or adverse events in ED patients with AWS.

No, authors do not have interests to disclose

327 Tenecteplase Versus Alteplase in Acute Ischemic Stroke: Finding the Correct '-ase' and 'Dosage' Using Network Meta-analysis Approach

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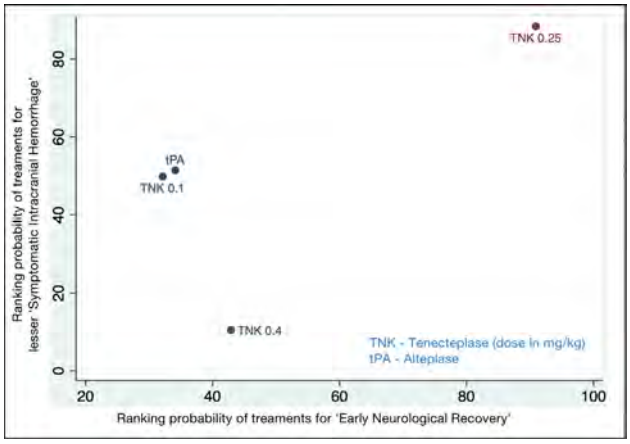
Study Objectives: We conducted this network meta-analysis (NMA) to investigate the efficacy of tenecteplase as compared to alteplase in acute ischemic stroke (AIS), in terms of symptomatic intracranial hemorrhage (sICH) and early neurological recovery (ENI) within </=72hours. Secondary outcomes studied were excellent neurological recovery (assessed by modified Rankin Scale, mRS 0-1), functional independence (mRS 0-2), and death at 3-months.

Methods: Databases (PubMed, Embase and Web of Science) were searched for randomized clinical trials (RCTs) comparing tenecteplase (various doses) with alteplase or with a different dose of tenecteplase from the intervention arm, in AIS eligible for intravenous thrombolysis. Clinical endpoints were defined as per the individual studies. Risk of bias of RCTs were assessed using Cochrane's Risk of Bias-2 tool (ROB-2) and the quality of the network meta analysis (NMA) estimates were assessed using the Confidence in Network Meta- analysis (CINeMA) framework. This NMA was conducted by frequentist approach. Summary NMA statistics (risk ratio, RR) of the intervention effects for all pairs of interventions was presented in a forest plot. To rank the treatments for each outcome, we used the surface under cumulative ranking curve (SUCRA) method. The relative ranking for ENI and sICH was modeled jointly in a two-dimensional scatterplot. Coherence of NMA estimates were investigated by local (node-splitting) and global approach. All the analysis were conducted in Stata software (version-14).

Results: Nine RCTs were finally included in the NMA which were published between 2010-2022. Different doses of Tenecteplase was compared with Alteplase as control in eight out of nine trials, whereas one RCT compared different doses of Tenecteplase (0.25mg/kg versus 0.4mg/kg) only. Four treatment options were analyzed in the NMA. Out of 2429 patients studied, 1460 received tenecteplase (116-0.1mg/kg, 466- 0.4mg/kg and 878-0.4mg/kg) and 969 received alteplase (0.9mg/kg). Mean age of the population was 70years, with 57% male patients in each arm. Symptomatic ICH was found to be significantly higher in tenecteplase-0.4mg/kg as compared to alteplase (RR: 2.65, 95% CI: 1.10-6.39). The ENI and all of secondary outcomes were similar in all four arms. Tenecteplase-0.25mg/kg was found to be the most effective and safe treatment for all outcomes by SUCRA ranking, and after joint modeling of ENI and sICH (Figure). The results of NMA were found to be coherent for all outcomes in both local and global approach. The confidence in the NMA results were 'very low' in all treatment pairs, except in tenecteplase-0.25mg/kg versus 0.4mg/kg ('low' confidence).

Conclusion: Tenecteplase at 0.25mg/kg dose was probably the most effective and safe treatment in AIS patients undergoing intravenous thrombolysis, although the confidence in this result was 'very low'.



No, authors do not have interests to disclose

328 Emergency Department Preparedness to Care for Sexual Assault Survivors: A Nationwide Study

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Study Objectives: Ideally, emergency departments (EDs) provide trauma-responsive care to sexual assault (SA) survivors and connect them with longitudinal physical and mental health services. However, qualitative studies indicate that ED care may retraumatize survivors, and a 2013 survey found that only ~20% of US hospitals provide comprehensive services. The aims of this study were to 1) document updated trends in the quality-of-care and resources offered to SA survivors, and 2) identify potential disparities according to geographic regions in the US, urban versus rural clinic locations, and the availability of sexual assault nurse examiners (SANEs).

Methods: A survey on ED care of SA survivors was conducted with SA patient advocates between June and August 2021. Advocates are volunteers or staff dispatched from rape crisis centers to support survivors during ED care. SA patient advocates were recruited from participating rape crisis centers via email to complete an online survey.

Survey questions addressed two major themes in quality-of-care: staff preparedness to provide trauma-response care and available resources. Non-parametric Wilcoxon rank-sum and Kruskal-Wallis tests were used to analyze differences in responses according to geographic regions and SANE presence.

Results: 315 advocates from 99 crisis centers completed the survey. Staff preparedness to provide trauma-informed care was assessed through observations of staff behaviors. Over half of respondents (53.2%), reported that they observe ED staff conveying skepticism about the patient's account of sexual assault sometimes, often, or always. 43.9% stated that they sometimes, often, or always observed ED staff pressuring survivors to complete a forensic exam or file a police report.

Advocates who indicated that a higher proportion of their cases were attended by SANEs were more likely to report higher rates of trauma-informed staff behaviors. For example, the observed rate of staff asking patients for consent at every step of the exam was significantly associated with SANE presence (P=4.0e-7).

With respect to access to resources, 66.7% of advocates reported that hospitals often or always have evidence collection kits available, 30.6% reported that resources such as transportation and housing are often or always available, and 55.3% reported that SANE nurses are often or always part of the care team. SANEs were reported to be more often available in the Southwest than other US regions (p=4.0e-3) and in urban as opposed to rural areas (p=6.0e-4).

Conclusion: This study provides an updated national context demonstrating that increased hospital preparedness is needed to elevate quality and equity in the ED care of SA patients. Consistent standards should include increased ED staff training in trauma-informed care and more robust connections with comprehensive resources. Notably, consistent support from SANEs was highly associated with trauma-informed staff behaviors and comprehensive resources. While this association likely partially reflects hospital priorities and resources that align with hiring SANEs, it is also consistent with research demonstrating the positive impact of SANEs sharing their expertise with other ED staff. Therefore, increased ED coverage by SANE nurses and opportunities for interprofessional education should be prioritized. This is particularly important to address disparities in the quality of care offered to urban versus rural SA survivors.

Survey Item		N, %	Median Likert Scale Response by Region		Median Likert Scale Response by Urban-Rural Classification		Effect of SANE Nurse Presence on Survey Item
Health professionals convey (verbally and/or nonverbally) disbelief of the patient's account of their sexual assault.	Never	47, 14.6%	Midwest	Sometimes	Urban	Sometimes	
	Rarely	89, 27.7%	Northeast	Sometimes	Rural	Sometimes	
	Sometimes	148, 46.1%	Southeast	Sometimes			
	Often	21, 6.5%	Southwest	Sometimes			
	Always	2, 0.6%	West	Sometimes			
	Don't Know	14, 4.4%		P-Value: 0.617		P-Value: 0.268	**P-Value: 0.0007**
Health professionals ask patients for consent at every step of the exam.	Never	5, 1.7%	Midwest	Often	Urban	Often	
	Rarely	34, 11.7%	Northeast	Often	Rural	Often	
	Sometimes	57, 19.6%	Southeast	Often			
	Often	78, 28.7%	Southwest	Often			
	Always	82, 30.1%	West	Often			
	Don't Know	20, 7.4%		P-Value: 0.662		P-Value: 0.0650644	**P-Value: 0.0000004**
Health professionals pressure survivors to complete the exam or to file a police report.	Never	62, 22.9%	Midwest	Sometimes	Urban	Rarely	
	Rarely	64, 23.6%	Northeast	Rarely	Rural	Rarely	
	Sometimes	83, 30.6%	Southeast	Sometimes			
	Often	28, 10.3%	Southwest	Rarely			
	Always	8, 3.0%	West	Rarely			
	Don't Know	26, 9.6%		P-Value: 0.0949		P-Value: 0.58096	P-Value: 0.1214
Hospitals have evidence collection kits available.	Never	7, 2.5%	Midwest	Always	Urban	Always	
	Rarely	7, 2.5%	Northeast	Always	Rural	Always	
	Sometimes	32, 11.6%	Southeast	Often			
	Often	45, 16.2%	Southwest	Always/Often			
	Always	140, 50.5%	West	Always			
	Don't Know	46, 16.6%		**P-Value: 0.0001**		P-Value: 0.621	**P-Value: 0.00001**
Hospitals have resources, to address survivors' basic needs after discharge.	Never	25, 9.0%	Midwest	Sometimes	Urban	Sometimes	
	Rarely	58, 20.9%	Northeast	Sometimes	Rural	Sometimes	
	Sometimes	76, 27.3%	Southeast	Sometimes			
	Often	52, 18.7%	Southwest	Rarely			
	Always	33, 11.9%	West	Often			
	Don't Know	34, 12.2%		**P-Value: 0.013**		**P-Value: 0.016**	**P-Value: 0.001**
SANE nurses are part of the patient care team.	Never	8, 2.9%	Midwest	Often	Urban	Often	
	Rarely	24, 8.7%	Northeast	Often	Rural	Sometimes	
	Sometimes	53, 19.1%	Southeast	Often			
	Often	65, 23.5%	Southwest	Always			
	Always	88, 31.8%	West	Often			
	Don't Know	39, 14.1%		**P-Value: 0.001**		**P-Value: 0.00005**	

Table 1: Selected Indicators of Hospital Preparedness

No, authors do not have interests to disclose

329 Epidemiology and Outcomes of Out-of-Hospital Cardiac Arrest Patients in Flint, MI

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Introduction: The American Heart Association indicated that roughly 350,000 adults in the United States suffered an out-of-hospital cardiac arrest (OHCA) in 2015. Michigan health data showed that rates of cardiovascular disease and other medical comorbidities in the state are higher compared to the US population, and higher still in Genesee County compared to Michigan's population. Information from an OHCA registry identified a hospital within Genesee County as below average for survival when compared nationally and within the State. Identifying risk factors and common trends predicting poor outcomes among Genesee County OHCA patients can inform interventions to improve survival with good neurologic outcomes.

Methods: We conducted a retrospective chart review study at a single, urban, level 1 trauma center. IRB approval was obtained to collect and analyze adult non-traumatic OHCA patients identified from January 2015 through December 2019. Patient demographics and EMS system factors were collected, in addition to survival and neurological outcomes. Our data were analyzed using descriptive statistics, and bivariate and multivariable analysis were used to examine relationships between demographic and clinical variables and patient outcomes.

Results: 661 OHCA patients were identified by the medical records department. 68 records were excluded as most were found to be related to a traumatic event or the arrest occurred during an interfacility transfer, yielding a final sample size of 593. Results showed that 61.4% of cases were male, the mean (standard deviation) age was 60.7 (15.8), 55.1% were white, and 37.6% were black. There was an abundance of comorbidities in our patients as well: 53.3% with hypertension, 28.2% with diabetes, 34.4% used tobacco products, 11.3% had history of alcohol use disorder, and 14.5% with substance use disorder. We found that 8.4% of cases were related to overdose. In addition, 41.1% of cases had no documentation from out-of-hospital providers, 24.6% had a short out-of-hospital record, and 33.9% had a full out-of-hospital record. From this data we found that 20.9% of our patients received bystander CPR and 39.6% of arrests were witnessed. A shockable cardiac rhythm was found in 18.7% of patients. An AED was applied in the out-of-hospital setting to 29.8% of patients. In terms of patient outcomes, 12.8% survived, 46.5% died in the ED, and 40.6% died after the ED. 7.3% were discharged with a good neurological outcome. We found 14.3% of our cases met the definition of an Utstein arrest patient (witnessed, shockable arrest). Of those, 23.1% were discharged with a good neurological outcome compared to 5.0% of the non-Utstein patients, p<.001. Witnessed arrests, bystander CPR use, and AED application were statistically significantly associated with improved neurological outcomes.

Conclusion: Results support that, in Flint, MI, witnessed cardiac arrests with early bystander CPR coupled with having a treated shockable cardiac rhythm improves survival with good neurological outcomes. Therefore, layperson CPR/AED training becomes paramount in achieving this outcome. There was also an abundance of comorbid conditions in our study. Controlling chronic health conditions and curbing unhealthy habits such as tobacco abuse can decrease the overall cardiac arrest rate as well. Encouraging widespread OHCA registry use with the EMS and Hospital stakeholders can improve health outcomes by targeting interventions that have the biggest impact.

No, authors do not have interests to disclose

330 EMS Operational Adaptations to the COVID-19 Pandemic

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Study Objectives: The COVID-19 pandemic presented new and unique challenges to EMS agencies. In the absence of a unified strategy to address COVID-19, agencies across the country made changes to routine operations to ensure provider and patient safety while providing life-saving care. We conducted a survey of EMS agencies in the United States to assess adaptations made in response to COVID-19.

Methods: A convenience sample of EMS agency leaders were provided a link to an IRB-approved survey by e-mail and/or social network. Survey results from responding agencies were analyzed using Microsoft Excel software.

Results: Twelve survey responses were received representing agencies across six states (TX, MO, PA, WA, VA, NC). All respondents began using dispatch screening questions to identify patients with a potential COVID-19 infection. EMS call volume

at the peak of local infections was somewhat or significantly reduced in all but one responding agency. Fifty-eight percent, however, reported increased call duration. Thirty-three percent reported lower than average unit staffing. Due to supply shortages, two-thirds of respondents reported often or always reusing PPE intended for single use. Oxygen delivery via nasal cannula or non-rebreather mask was unchanged in ninety-two percent of agencies, while two-thirds of agencies changed equipment for bag-valve-mask ventilation (eg addition of HEPA filtration). Only two agencies continued to use nebulized medications under standard protocols, while five ceased administration of nebulized medications entirely. Three of the five agencies which stopped using nebulized medications and the one agency which ceased use of CPAP began performing intravenous or subcutaneous beta-agonist (eg Epinephrine or Terbutaline) administration for respiratory distress. Seventy-five percent of agencies modified non-invasive positive pressure ventilation procedures. Eighty-three percent of agencies reported making significant procedural changes for endotracheal intubation while only fifty-eight percent altered their use of supraglottic airway devices. Sixty-seven percent of agencies modified cardiopulmonary resuscitation procedures. US agencies indicated that they took additional precautions when performing airway procedures such as: halting or limiting certain aerosol-generating procedures (75%), limiting the number of individuals at the bedside (83%), and performing airway procedures in outdoor or well-ventilated areas (63%). Ninety-two percent of agencies began administering COVID-19 vaccinations.

Conclusion: US EMS agencies around the country adapted their daily operations in response to COVID-19. The highly varied approaches highlight the lack of best practices or standard guidelines available for agencies to follow to mitigate safety concerns while maintaining the standard of care. Further investigation is needed to determine the clinical impact of these changes.

No, authors do not have interests to disclose

331 Emergency Medical Service Providers Perspectives of Pediatric Non-Transport

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Study Objectives: One-third of pediatric Emergency Medical Services (EMS) calls result in a child being left at the scene. There are, however, very few EMS agencies with protocols to help EMS providers determine when non-transport might be safe. Little is known about how EMS providers currently make non-transport decisions. Our objective was to describe how EMS providers currently make pediatric non-transport decisions and identify enablers and barriers to successfully implementing a pediatric non-transport triage tool.

Methods: We conducted virtual focus groups with EMS providers from the mid-Atlantic region. We used purposive sampling to ensure we captured a diverse sample for individual demographics, clinical experience, and EMS agency type. We refined a semi-structured moderator guide based on key informant interviews. A PhD-trained facilitator then moderated all groups using the final guide. De-identified transcripts were coded using Dedoose. Five study team members independently coded a sample transcript and reviewed it for inter- rater agreement. One team member then completed axial coding of the remaining transcripts until we had reached thematic saturation. Clusters of similar codes were grouped into themes by consensus.

Results: We recruited 50 participants, of whom 70% were Paramedics and 28% EMTs (Table 1). Participants came from diverse settings with 64% suburban, 24% urban, and 12% rural. Participants had a median of 14 years of clinical experience. EMS providers agreed that caregivers often utilize 911 for low acuity complaints. Subthemes identified included: (1) lack of access to after-hours primary care, (2) lack of education on what constitutes an emergency, and (3) anxiety amongst first-time parents. EMS providers uniformly described pediatric non-transport as a result of shared decision-making between EMS providers and caregivers. There was widespread agreement that while EMS providers commonly advise whether transport is necessary, caregivers are responsible for making the final decision (and then signing against medical advice (AMA) documentation). Subthemes for how non-transport decisions were made included: (1) individual experience as a caregiver, (2) presence of agency protocols, (3) availability of other health care resources, (4) fear of legal liability, and (5) absence of a legal guardian at the scene. Participants identified the following features that would enable successful implementation of an EMS non-transport protocol: (1) user- friendly interface, (2) short completion time, (3) mandatory documentation of vital signs, (4) clear protocol endpoints, (5) and optional online medical control with telemedicine capabilities. Representative supporting quotes for themes are provided in Table 2.

Conclusions: EMS providers believe that a substantial proportion of pediatric EMS calls are for low acuity complaints that do not need emergent transport to the ED. In the absence of pediatric non-transport protocols, EMS providers commonly advise caregivers whether transport is necessary and ask them to sign AMA documentation. EMS providers identified multiple factors that would enable a formal non-transport protocol to be implemented successfully.

Variable	N	%
Age		
Median	37 years	
Gender		
Male	34	68%
Female	16	32%
Race		
White	42	84%
Black/African-American	4	8%
Asian	2	4%
American Indian/Alaskan Native	1	2%
Other	1	2%
Ethnicity		
Non-Hispanic	49	98%
Hispanic	1	2%
Provider Level		
Paramedic	35	70%
EMT	14	28%
Other	1	2%
Years Experience		
Median	14 years	
Professional Roles§		
Other Leadership Role	21	42%
Educator	20	40%
Shift Supervisor	7	14%
QI Officer	5	10%
No other role	16	32%
State		
Maryland	31	62%
Virginia	13	26%
DC	6	12%
Pennsylvania	4	8%
Urbanicity		
Suburban	32	64%
Urban	12	24%
Rural	6	12%

Table 1: Focus group participant demographic profiles
§ Participants could check multiple responses for this category

Theme: Low acuity pediatric EMS calls are common	Theme: Shared decision making for non-transport
(1) Lack of access to after-hours primary care "A lot of the patients that I run in my area, they're a little bit below the poverty line, so they don't have easy access to get to primary care physicians or even just to regular doctor visits. So, it's easier to just call 911."	"We'll go through a full assessment with a child and express an opinion, and it's really a consensus building approach to the conversation. It's not a 'this is what we found; your child doesn't need transport.' It's more conversational ... we typically get consensus with the parent about what's the best thing to do." "We live in a day and age now where an ambulance transport cost $300 or more; an ER visit costs $1,000 or more. Can they go to their pediatrician same day? Can they go to urgent care? If you have a perceived minor issue, maybe theres other alternatives out there. ... I want them to make informed decisions as well." "I say, 'Hey look...you can go to the ER and see a doctor, but you kid's not that serious and they're going to be waiting the 162-minute wait time. Would it be beneficial for you to just call your pediatrician who may be able to get you seen in like an afternoon sick visit appointment versus going that ER and waiting two or three hours before you actually see an actual doctor'." "I feel, though, they ask quite frequently, 'What would you do?' 'What would you do if it was your child?' If you give them your honest opinion, 'but if was my child I'd rather be seen by my pediatrician and I wouldn't transport,' it might be skewed into they don't need to be transported."
(2) Uncertainty about what constitutes an emergency "I mean I'm sure we've all been there - dispatched for like choking or cardiac arrest, and it just ends up being a kid who spit up, choked a little bit, ...and is sitting there perky, happy as can be when get there... But, how do we educate parents as to what stuff is like normal versus what isn't?" "I think that maybe ...providers could do like a better job as far as well-baby care. Like incorporating 'these are some things you may run across, and this is how you should treat a fever, sickness, and this is when you should call 911 and this is when you shouldn't...'" **(3) Anxiety amongst first-time parents** "A lot of times, especially with new parents, it's just a fear of 'Oh no, something happened to my child,' whether it's a bump or fall."	
Theme: Enablers of successful non-transport protocol	**Theme: Factors that influence non-transport decision**
(1) User-friendly interface "User friendly; accessed easily and quick." **(2) Short completion time** "I think a less is more approach is ideal." "Having something that's less bulky, more decisive, not as many levels to have to work through. A lot of times, especially with refusals, I think our current refusal form has something like 47 different questions or something... So, having something that's more 'Do they meet this? Yes. Do they meet this? Yes, transport. If no, then don't transport.'" **(3) Mandatory documentation of vital signs** "They [vital signs] should be required. I don't think it's necessarily that it needs to be the actual judgment based off of the vital signs, but vital signs should be required." **(4) Clear protocol endpoints** "A flow path algorithm, something like that. If you see X, do Y; and take the grey out of it; keep it very black and white. You know, it's hard to make patients fit into a category, but the patients that can't fit into a category should probably be transported." **(5) Optional online medical control with telemedicine** "I really, really super like the Telehealth option with having some kind of additional eyes on the patient that could also be an additional recording of the parent understanding of the opinions that are being given to them before the decision is being made. I love having the option for online medical control to consult, but to require that on every patient, I think it would be tedious and probably not a welcomed change."	**(1) Individual experience as a caregiver** "I have four kids, so I can at least coach them through that process of it's really not a sickness as it is you just freaking out. But you can't really tell them that." "I've got three kids myself, so I think I do a pretty good job of relating on a personal level and communicating with the parents what I think is going on and what a good treatment plan is." **(2) Presence of agency protocols** "Obviously, most of us probably have in our protocol that everything will be patient-initiated refusals. I don't know of anyone that has EMS-initiated refusals yet." **(3) Availability of other healthcare resources** "I think first we have to make sure that they have access to health care. In my particular area, we've tossed around the idea of having transportation vouchers of some sort, and we do have a pediatric urgent care that is open weeknights and weekends." **(4) Fear of legal liability** "I think everyone innately is going to be from a liability standpoint and just like conscience standpoint of like, 'Of course, we'll take your child'." "If the parents want to go, they go. If the parents don't want to go, now I can try to get them into going because I'll say, 'You really need to go.' But I can never try to talk them out of going. That as a lawyer, that's a legal minefield to me." **(5) Absence of a legal guardian at the scene** "At schools, there's an obligation to transport, because the parents typically aren't there with the child."

Table 2: Key themes with representative supporting participant quotes

No, authors do not have interests to disclose

332 The Hidden Factors of Health: A Mixed Methods Study of EMS Provider Knowledge and Perceptions of Social Risk Factors

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Study Objectives: Social risk factors (SRF), including food and housing insecurity, health literacy and access, and substance abuse, are adversities that negatively impact patients' health. Often the first point of contact with the health care system for patients, Emergency Medical Services (EMS) providers are well poised to initiate addressing these SRF and thereby improve patient care. However, current EMS training rarely includes SRF, and EMS reporting systems concentrate on medical information, excluding or sidelining SRF. The objective of this study was to understand EMS providers' knowledge and perceptions of SRF, in addition to understanding areas for improvement concerning SRF in communities and health care systems.

Methods: This study included a qualitative and quantitative analysis of data gathered from EMS provider focus groups from a large New York-based EMS system. A secure online workspace was used to sample participants, resulting in three separate focus group sessions which were conducted between November-December 2021 (n= 7, 6 and 6, respectively). The focus group sessions were recorded and transcribed for thematic qualitative analysis using a six-phase inductive approach. An electronic survey was sent to participants upon the completion of each session, of which provided quantitative data regarding participants' roles, training, and encounters with SRF.

Results: There were 19 total participants over the three focus group sessions, with 11 completing the post-session survey. The majority of participants were male (68.4%) and paramedic trained (42.1% paramedic, 26.3% critical care paramedic). Three major themes identified as part of the focus group sessions and were as follows: SRF knowledge and perceptions, barriers to reporting and documenting SRF, and facilitators to reporting and documenting SRF. EMS providers had a comprehensive knowledge of SRF and perceived them to negatively impact health in various ways. Frequently reported SRF encountered by providers on emergency calls were financial, housing insecurity, health literacy, health insurance, substance use, and access to resources. EMS providers reported they observed these risk factors in half of their daily calls (median= 50%). Although the majority of participants indicated that they do not have a specific method to identify SRF, 90.9% indicated that they physically report them "at least some of the time" or more. Identified barriers to reporting included lack of follow up, workload, patient interactions, and lack of infrastructure in both the out-of-hospital and hospital setting. Education for patients and providers as well as community-based support would improve how SRF are addressed. In the follow up survey, of those that responded, about half of participants (54.5%) had never received formal training about SRF. All providers that responded were interested in receiving formal training on SRF.

Conclusion: This study found that while EMS providers recognize SRF as a major implication for patient outcomes following emergency calls, there are multiple barriers to reporting these SRF and improving patient care. Implementation of a formal infrastructure and education for providers, patients, and communities could work towards improving this gap between necessity and current capability to address SRF in the out-of-hospital setting.

No, authors do not have interests to disclose

333 Prevalence of Moral Injury and its Clinical Consequences Among Filipino Emergency Physicians During the COVID-19 Pandemic: A Cross-Sectional Study

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Background: Moral Injury is defined as the distress experienced by an individual when circumstances are discordant with one's ethical code. If left unaddressed, it can become a risk factor for a range of mental health issues. The COVID-19 pandemic has recently been regarded as a cause of moral injury for Filipino health care workers but to date, has not been formally investigated.

Study Objectives: We aimed to determine the prevalence of moral injury, identify risk factors and clinical consequences on mental health among Filipino emergency physicians who worked during the COVID-19 pandemic.

Method: Our cross-sectional study utilized a nationwide survey of Emergency Medicine Residents and Consultants from accredited training programs in the Philippines. The online questionnaire comprised of 4 validated tools for mental health evaluation: Moral Injury Symptom Scale-Health Professionals, Belief Into Action Scale, Abbreviated Maslach Burnout Inventory and Kessler Psychological Distress Scale. The survey was conducted from August to October 2021.

Results: A total of 129 emergency physicians responded to the survey, which revealed high prevalence of moral injury at 96.9%. Concurrent with this, respondents were found to suffer from burnout causing emotional exhaustion (p=0.007) and depersonalization (p=0.044) as well as anxiety and depression (p=0.002). Females and those that do not have any children were more likely to experience moral injury.

Conclusion: There is high prevalence of moral injury among Filipino emergency physicians during the period of study, which coincided with the second wave of the COVID-19 pandemic in the country. Moral injury was also associated with the co-occurrence of burnout, anxiety and depression.

Table 1. Prevalence of Moral Injury Among Respondents

MISS-HP Scores	Frequency
Patients with score of 36 or higher in the MISS-HP	125
Total number of respondents	129
Prevalence of Moral Injury	**96.90%**

Table 2. Correlation of Moral Injury with Clinical Consequences using Spearman's Rank Correlation

	Spearman's Rank Correlation	p-value
Religiosity	0.108	0.232
Personal Accomplishment	-0.092	0.307
Emotional Exhaustion	0.241	0.007
Depersonalization	0.180	0.044
Anxiety and Depression	0.277	0.002

No, authors do not have interests to disclose

335 "4Ms" Conversation in the Emergency Department: A Qualitative Study

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Background: Older adults comprise about 20% of all visits in the emergency department (ED) and are often among the sickest patients with multiple comorbidities. As the number of older adults in the US continues to rise, evidence-based methods to deliver age-appropriate care in the ED are becoming increasingly important. The Age-Friendly Health Systems framework (4Ms-Medication, Mentation, Mobility, and What Matters) has potential to improve care of older adults. A knowledge gap exits in the delivery of age-friendly health care in various clinical settings such as the ED. The application of the 4Ms framework within the context of the ED needs evaluation.

Methods: A qualitative study was conducted using the 4Ms framework to understand the goals of care of adults aged 60 or older receiving care in a single ED. The usability of a 4Ms worksheet was also assessed and any discrepancies between the patient perspective and the provider perspective on goals of care were identified. We conducted semi-structured interviews with a convenient sampling of patients and their providers. Interviews were supplemented with the use of a previously developed 4Ms worksheet. Interview data was entered in RedCap. The research team (two coders per interview) reviewed interviews and inductively assigned codes and developed definitions of codes, revising the codebook with each interview. Any discrepancies were resolved through discussion and consensus. Once codes and definitions were determined, codes were grouped into themes and sub-themes within the 4Ms framework.

Results: A total of 20 ED patients with decision making capacity per treating physician participated in the interviews and completed the worksheet, which took 30 minutes to 1 hour to complete. Three themes were identified: 1) immediate problem-oriented goals vs. underlying goals of care, 2) patient preference for conversation over the worksheet, and 3) patient-provider discrepancy in underlying goals of care. Patients expressed that the problem-oriented goals of care were often the symptom or immediate problem that brought them to the ED while the underlying goals of care often related to psychosocial aspects driving the problem- oriented goals of care. These psychosocial aspects were often intersections of the 4Ms. Some of the most common intersections were between loss of mobility and depressed mood resulting in overall decreased independence. Additionally, concerns with polypharmacy and patient education on medications were identified as contributing to underlying goals of care. Finally, patients expressed that they preferred a conversational format over filling out the 4Ms worksheet. There was general concordance between patients and providers on problem-oriented goals of care, but discrepancies emerged between patients and providers with underlying goals of care.

Conclusions: Our results showed that we were able to elicit both problem-oriented and underlying goals of care using the 4Ms framework and identified the concordance and discordance of goals of care between patients and providers. We recommend use of a conversation in the ED setting and consider using the worksheet to document it.

No, authors do not have interests to disclose

336 Impact of Emergency Department-Based Intensive Care Unit on Outcomes of Decompensating Boarding Patients in the Emergency Department

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Study Objectives: Emergency department (ED) boarding continues to increase as ED volumes and severity of illness rise without a concomitant increase in hospital capacity. A 2018 American College of Emergency Physicians (ACEP) Policy Statement defined a "boarded patient" as "a patient who remains in the ED after the patient has been admitted or placed into observation status at the facility, but has not been transferred to an inpatient or observation unit." Patients may decompensate prior to transfer to an inpatient bed necessitating escalation of their level of care. An ED-based intensive care unit (ED-ICU) model may serve as a resource for this patient population requiring care escalation. Our objective was to evaluate the impact of an ED-ICU on outcomes of patients who decompensated while boarding in the ED.

Methods: This is a retrospective observational study at a single quaternary academic center examining general care patients boarding in the ED who subsequently decompensated and required escalation to intensive care unit (ICU) level care prior to departure from the ED from October 2012 to December 2021. A retrospective electronic health record query extracted data elements, while other variables required manual chart review for extraction. Patients were divided into three cohorts: pre-ED-ICU implementation, post-ED- ICU implementation with transfer to ED-ICU, and post-ED-ICU implementation with direct admission to inpatient ICU without ED-ICU care. The primary outcome was ICU length of stay (LOS). Secondary outcomes included hospital LOS and rate of ICU admissions with ICU LOS <24 hours.

Results: We identified 1,123 ED visits that met inclusion criteria: 225 visits (20.0%) occurred pre-ED-ICU implementation; 898 visits (80.0%) occurred post-ED-ICU implementation with 780 visits (69.5%) involving care in the ED-ICU, and 118 visits (10.5%) with direct admission from ED to inpatient ICU. ICU LOS was shorter for patients cared for in an ED-ICU (M=47.7 h) compared to pre-ED-ICU (M=92.3 h, $p<0.001$) and post-ED-ICU implementation with direct admission to ICU (M=101.2 h, $p<0.001$). Hospital LOS was shorter for patients cared for in an ED-ICU (M=193.1 h) compared to pre-ED-ICU (M=246.8 h, $p<0.004$) and post- ED-ICU implementation with direct admission to ICU (M=259.5 h, $p=0.02$). Among all patients admitted to the inpatient ICU, the rate of admissions with ICU LOS <24 hours was lower for patients cared for in an ED- ICU (16.5%) compared to pre-ED-ICU (27.1%, $p<0.005$) and direct ED to inpatient ICU admissions post- ED-ICU implementation (32.2%, $p<0.001$).

Conclusion: For general care patients boarding in the ED who decompensate and require a higher level of care, an ED-ICU model is associated with decreased ICU LOS and hospital LOS, and a lower rate of short stay ICU admissions. These findings suggest the early coordinated delivery of critical care in an ED-ICU for decompensating boarding patients is associated with downstream resource preservation.

No, authors do not have interests to disclose

337 Association of Serum Magnesium Level at Emergency Department Arrival and Favorable Neurologic Outcome for Out-of-Hospital Cardiac Arrest

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Introduction: Electrolyte disturbances are associated with sudden cardiac arrest based on several cohort studies. However, little is known about the association between serum magnesium (S-Mg) level at ED arrival and survival of out-of-hospital cardiac arrest (OHCA) patients.

Hypothesis: We hypothesized S-Mg level at ED arrival is associated with favorable neurologic outcome of OHCA patients.

Methods: This is an observational study using Korean Cardiac Arrest Research Consortium (KoCARC) data from October 2015 to June 2020. EMS treated OHCA patients over 18 years old who survived to ICU admission were included. Those without S-Mg level were excluded. Exposure is S-Mg level at emergency department (ED) arrival and outcome was favorable neurologic outcome (cerebral performance category 1 or 2) at hospital discharge. S-Mg was categorized into three groups; Low group; 0-1.7mg/dl, Normal group;1.7- 2.3mg/dl, High group; over 2.3mg/dl). Multivariable logistic regression was performed to calculate adjusted odds ratios (AORs) with 95% confidence intervals (95% CIs) for outcome.

Results: From total 10,897 OHCA patients, 2,789 patients survived to ICU admission and 1,370 patients had initial S- Mg result. Neurologically favorable survival rate was 55.6% in normomagnesemia group, 27.0% in hypomagnesemia group and 22.9% in hypermagnesemia group. After adjusting out-of-hospital, hospital resuscitation and laboratory covariates, compared to normomagnesemia group, hypomagnesemia group (AOR 0.21 (95% CI 0.07-0.68)) and hypermagnesemia group (AOR 0.41 (95% CI 0.19-0.87)) showed worse outcome.

Conclusion: Low (S-Mg less than 1.7 mg/dl) or high (S-Mg over 2.3mg/dl) S-Mg level measured initially at ED arrival for OHCA patients was associated with worse neurologic outcome compared to normal S-Mg level (S-Mg 1.7- 2.3mg/dl). Based on this study, further study is needed to investigate the optimized S-Mg level for OHCA patient under resuscitation.

No, authors do not have interests to disclose

338 A National Snapshot of Social Determinants of Health Documentation in Emergency Departments

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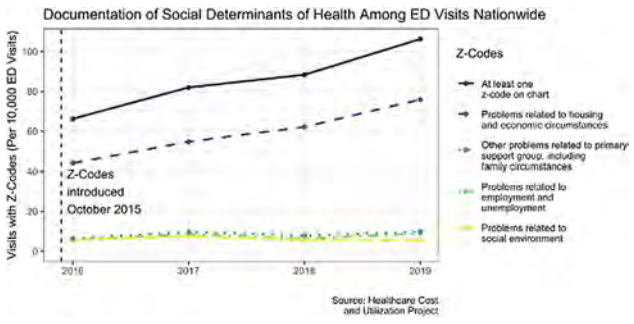
Study Objectives: Documentation and measurement of social determinants of health (SDOH) is critical to high-quality clinical care and to health care delivery system reforms targeting equity. Domains of SDOH are codified in the International Classification of Disease (ICD-10) z-codes and include inadequate housing, unemployment, education and literacy, social environment, and financial instability.

Z-codes are listed in only 1-2% of inpatient charts – identifying a much smaller population than in corresponding population-level estimates. A high prevalence of social vulnerability among emergency department (ED) patients demands accurate documentation of SDOH. No prior research has examined the use of z-codes among ED patient populations. This study describes z-code use in ED settings nationwide.

Methods: This was a repeated cross-sectional analysis of ED visit data in the U.S. from the Nationwide Emergency Department Sample from 2016 through 2019. We characterized z-code use, and described associations between z-code use and patient- and hospital-level factors. Variables included age, sex, race, insurance status, ED disposition, ED size, hospital urban-rural status, and ownership. We calculated unadjusted odds ratios using binary logistic regression for likelihood of z-code reporting for each ED visit with adjustment for visit- level weights and complex sample design and with standard errors clustered by hospital.

Results: Of the approximately 140 million ED visits per year, 0.65% had an associated z-code in 2016, rising to 1.17% by 2019. The most commonly used code was "problems with housing and economic circumstances," which grew from 2016 to 2019 (0.44% to 0.78%). Visits were more likely to have an associated z-code for adults aged 41-64 (OR=2.20; 95% CI, 2.05-2.37) compared to aged 19-25, male (OR=2.21; 95% CI, 2.09- 2.33) compared to female patients, those who identified their race as Black(OR=1.26; 95% CI, 1.11-1.44) or Native American (OR=1.53 ; 95% CI, 1.11-2.10) compared to white identified, those with Medicaid (OR=4.23; 95% CI, 3.79-4.72) or self-pay (OR=3.83; 95% CI, 3.38-4.34) compared to private insurance, and those who were admitted to the hospital (OR=3.89; 95% CI, 3.48-4.35). Examination of hospital-level characteristics showed the z-codes were more likely to be used at larger EDs with more than 80,000 visits (OR=2.06; 95% CI, 1.30-3.24) compared to smaller EDs with less than 20,000 visits, and academic (OR=1.69; 95% CI, 1.38-2.06) compared to non-teaching hospitals. Z-codes were less likely to be used at hospitals in micropolitan (OR=0.33; 95% CI, 0.26-0.42) and small metropolitan areas (OR=0.79; 95% CI, 0.64-0.98) compared to large metropolitan areas and not-for-profit (OR=0.56; 95% CI, 0.41-0.78) and investor-owned hospitals (OR=0.57; 95% CI, 0.38-0.85) compared to government controlled hospitals.

Conclusion: There is a paucity of z-code documentation among ED patients, though use is generally up-trending. Nearly all the growth in z-code use is attributable to codes for housing and economic circumstances. Future research is needed to better understand the drivers of provider z-code use and to improve on their utility. EDs are uniquely positioned within the house of medicine and the social safety net to identify and address SDOH, and only by improved measurement can we begin to craft policy solutions to address these important drivers of health inequity.



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Other
President of LogixHealth, a National ED Billing Company

339 Relationships of Jugular Bulb Parameters Used as Indicators of Cerebral Perfusion and Metabolism With Cerebral Perfusion and Metabolism After Resuscitation from Cardiac Arrest: A Post-hoc Analysis of Experimental Studies Using a Minipig Model

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Study Objectives: Cerebral blood flow (CBF) is reduced in the acute stage following resuscitation from cardiac arrest, posing an increased risk of secondary cerebral injury. Using data from experimental studies performed in minipigs, we investigated the relationships of parameters derived from arterial and jugular bulb blood gases and lactate levels (hereinafter referred to as jugular bulb parameters), which have been used as indicators of cerebral perfusion and metabolism, with CBF and cerebral lactate/creatine ratio measured with dynamic susceptibility contrast-magnetic resonance imaging and proton magnetic resonance spectroscopy, respectively.

Methods: We retrospectively analyzed 36 sets of the following data obtained during the early postresuscitation period: percent of measured CBF relative to that at the pre-arrest baseline (%CBF), cerebral lactate/creatine ratio, and jugular bulb parameters including jugular bulb oxygen saturation, jugular bulb lactate, arterial-jugular bulb oxygen content difference (AJDO2), cerebral extraction of oxygen (CEO2), jugular bulb-arterial lactate content difference, lactate oxygen index, estimated respiratory quotient, and arterial-jugular bulb hydrogen ion content difference (AJDH+). Linear mixed effect models were constructed to examine the effects of each jugular bulb parameter on the %CBF and cerebral lactate/creatine ratio.

Results: In the models, the AJDO2 ($P = 0.047$) and CEO2 ($P = 0.030$) had a significant linear relationship with %CBF, but they explained 12.0% (semi-partial $R2 = 0.120$; 95% confidence interval [CI] = 0.002 – 0.371) and 14.2% (semi-partial $R2 = 0.142$; 95% CI = 0.005 – 0.396) of the total %CBF variance, respectively. The AJDH+ had a significant linear relationship with cerebral lactate/creatine ratio ($P = 0.037$), but explained only 13.8% (semi-partial $R2 = 0.138$; 95% CI = 0.003 – 0.412) of the total lactate/creatine ratio variance. None of the other jugular bulb parameters were related to %CBF or cerebral lactate/creatine ratio.

Conclusion: In conclusion, none of the jugular bulb parameters appeared to provide sufficient information on cerebral perfusion and metabolism in this setting.

No, authors do not have interests to disclose

340 The Accuracy of Predictive Analytics in Forecasting Emergency Department Volume Pre- and Post-COVID Pandemic

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Background: Forecasting emergency department (ED) volume is a critical piece of determining staffing needs. Methods of doing so have historically relied on prior volumes and subjective predictions of future volumes. Objective methods of volume prediction, such as triple exponential smoothing (TES), are more accurate. However, highly variable periods brought on by times of extreme uncertainty, such as the COVID pandemic, raise questions about predictive capacity.

Study Objectives: We sought to determine which method of triple exponential smoothing was most accurate in predicting pre-pandemic and post-COVID (after the onset of COVID in February, 2020) ED volume, the effects of the pandemic on their accuracy, and whether such models could regain the pre-pandemic accuracy after the disruptive influence of COVID began.

Methods: Four methods of monthly volume forecasting were compared: simple exponential smoothing with a 24-month run-up (SES), Microsoft Excel's AAA version of the exponential smoothing (ES) algorithm with a 24-month run-up, Holt-Winter TES using 12 and 24-month run-up. Accuracy was assessed using mean absolute percentage error (MAPE). We examined data from four emergency departments between March 2018 and March 2022, 3 adult emergency departments and 1 pediatric emergency department, with total pre-COVID annual census >250,000 patients.

Results: In the 24-months pre-COVID, the overall average MAPE across 4 TES methods was 2.49% ± 0.53%, while the overall average MAPE for the 24 months after the onset of the COVID pandemic was 12.56% ± 5.11%. Among all EDs, the 24-month Holt-Winter had the greatest accuracy pre-COVID, 1.58% ± 0.35% and post-COVID, 8.26% ± 3.40%. Using an acceptable standard of error limit of 1 standard deviation above the upper range pre-COVID MAPE (3.02%), the 24-month Holt-Winter TES was accurate 38.5% of the time post-COVID. There was no indication that the model's accuracy improved with time post-COVID. The pediatric ED was consistently less accurate than the adult EDs, pre-COVID (5.72% ± 3.1%) and post- COVID (19.47% ± 15.73%). Using all 4 EDs, the 24-month Holt-Winter TES model's accuracy decreased from 2.35% ± 0.47% for pre-COVID to 10.09% ± 0.62% post-COVID. (See Table 1) An example of the forecasting models is shown in Figure 1 for one adult ED site.

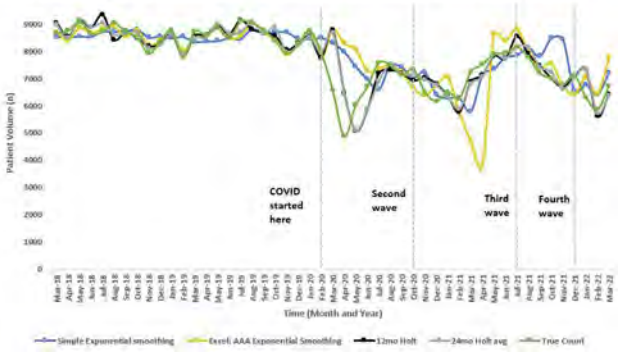
Conclusions: Triple exponential smoothing represents an improvement in the accuracy of ED volume prediction. However, the COVID pandemic has significantly upset this balance, resulting in accuracy levels that are 4-5 times lower than they once were. Post-COVID, even the most accurate TES method was only able to meet pre-COVID predictive accuracy levels approximately 1/3rd of the time and it's forecasting ability didn't improve over time. Hospital and ED operations leadership need to take this into account when forecasting budgetary needs. Future work confirming this decrease in forecasting accuracy, nationally and regionally, is needed.

Table 1. 24-month Holt-Winter MAPE %'s only presented here for consistency

	Pre-COVID MAPE	Post-COVID MAPE
	MAPE (%) 95% CI	MAPE (%) 95% CI
AED 1	2.31 (1.67-2.94)	7.05 (4.44-9.66)
AED 2	2.35 (1.37-3.34)	10.63 (3.69-17.56)
AED 3	3.10 (1.56-4.64)	9.17 (-1.43-19.78)
PED 1	5.72 (2.62-8.82)	19.47 (3.74-35.20)
Overall	2.35 (1.88-2.82)	10.09 (6.47-13.71)
AED Overall	1.58 (1.23-1.92)	8.26 (4.86-11.66)

NOTE: CI: Confidence interval, AED: Adult Emergency Department, PED: Pediatric Emergency Department

Figure 1. Adult emergency medicine site #1 trend in actual and forecasted patient volume over time



No, authors do not have interests to disclose

341 Short-Term Emergency Department Encounters Following Primary Care Telemedicine Visits in the Era of COVID-19

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Background: The COVID-19 pandemic increased ambulatory care telemedicine use. There is limited understanding of downstream short-term ED encounter outcomes following primary care telemedicine for emergency department (ED)-sensitive conditions.

Study Objective: Among adults with cardiac, abdominal, or respiratory illness, to describe patient and visit characteristics associated with primary care video or telephone visits and to calculate the frequency of ED encounters within 7 and 30 days after a primary care telemedicine encounter for a cardiac, abdominal, or respiratory illness during the COVID-19 pandemic.

Methods: In a retrospective cohort study of all Kaiser Permanente Northern California adult patient-initiated primary care telemedicine encounters with a diagnosis of acute cardiac, abdominal, or respiratory illness between 3/1/2020 and 7/31/2021, we calculated unadjusted rates of all-cause ED visits within 7 and 30 days and describe patient and visit characteristics.

Results: Of 431,705 eligible telemedicine encounters, 15.8% were cardiac diagnoses, 48.1% were abdominal diagnoses, and 36.1% were respiratory diagnoses. Patient sociodemographic and clinical characteristics by diagnosis are presented in the Table. Telephone visits ranged from 63.8% of cardiac to 67.3% of abdominal to 77.2% of respiratory telemedicine encounters, and the remainder of encounters comprised of video visits. Booking to appointment time of less than 12 hours accounted for 50.8%, 47.1%, and 63.6% of cardiac, abdominal, and respiratory telemedicine visits, respectively. All-cause 7-day ED visit rates for cardiac, abdominal, and respiratory illnesses were 7.1%, 5.7%, and 4.7%, respectively. All-cause 30-day ED visit rates for cardiac, abdominal, and respiratory illnesses were 9.8%, 8.8%, and 7.4%, respectively.

Conclusions: ED encounters following a telemedicine appointment for cardiac, abdominal, or respiratory illness were infrequent. Further analysis of how independent characteristics are associated with ED visits for acute conditions is important for understanding patient risk.

Table. Sociodemographic, Clinical, and Telemedicine Characteristics of Primary Care Telephone and Video Visits for Cardiac, Abdominal and Respiratory Diagnoses

Characteristics	Overall	Cardiac	Abdominal	Respiratory
N	431,705	68,266	207,706	155,733
Sociodemographic				
Age, Mean (SD)	47.8 (17.5)	47.8 (17.3)	48.3 (17.9)	47.2 (17.0)
Female, %	58.3	57.4	59.9	56.5
Non-Hispanic White, %	40.8	42.6	41.6	38.9
Primary Language English, %	74.1	73.9	71.9	76.9
Lowest Decile of Households w/ Internet Census Tract, %	10.1	9.5	9.9	10.7
Patient Resides in Low SES Census Tract, %	13.7	12.3	13.4	14.8
Clinical				
Elixhauser Score, %				
0	58.3	59.5	57.6	58.7
1-2	26.5	26.6	26.5	26.5
3+	15.3	13.9	15.9	14.9
Telemedicine				
Telephone Visit, %	70.3	63.8	67.3	77.2
Booked through call center, %	65.8	61.7	60.9	74.3
Time from booking to appointment <12 hours, %	53.7	50.8	47.1	63.6
Visit with assigned PCP, %	52.4	54.6	57.1	45.2

No, authors do not have interests to disclose

342 COVID 19 Infection Is Associated With Repeat Emergency Department Visits

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Study Objective: As COVID-19 persists and the number of people with prior infection increases, the long-term sequelae are still being discovered. These long-term effects create the potential for previously infected to seek care in the emergency department (ED). The objective this study is to determine if there is an association between COVID-19 infection and subsequent ED utilization and to describe the reason for return visits.

Methods: This observational, case-control study was performed at an academic Level 1 trauma center in eastern NC. Charts were randomly selected from 400 patients who received an initial COVID diagnosis in the ED (cases) and 400 COVID-19 negative patients matched for age and comorbidity (controls). Visits were recorded for the 18 months after the initial visit. Demographic data and chief complaint at each visit were also collected. Comparison of visit return rate was performed via a binary linear regression with p-value of 0.05 indicating significance. Odd's ratio for return visit with 95% confidence intervals are reported. Descriptive statistics are reported for categorical and demographic data.

Results: COVID-19 and control groups were of similar age (53.41, vs. 54.28 years, respectively). Both groups were predominately black (61.3% COVID-19 vs 70.6% control), followed by white (27.2% COVID-19 vs 26.2% control). The most common chief complaint for both groups in the first 6 months after enrollment was cardiovascular in nature. The second most common complaint was neuropsychiatric in the 0-3-month interval for both groups, while 4-6 months after enrollment COVID patients most often presented with neuropsychiatric complaints while control patients presented with gastrointestinal complaints. In total, 203 patients with a positive COVID-19 (50.8%) returned to the ED within an 18-month compared to 148 (37.1%) in the control group ($p < 0.001$; OR=1.8, 95% CI 1.496-2.694). Over the first 3 months, 17.3% of COVID-19 patients returned to the ED, while 12.0% of non-COVID patients returned (p=0.005; OR=1.5, 95% CI=1.189-2.691). At 4-6 months, 17.5% of COVID 19 patients returned to the ED compared to 13.5% of non-COVID patients (P=0.035; OR=1.4, 95% CI 1.031-2.261).

Conclusion: A positive COVID-19 Infection was associated with repeat visits to the ED within 18 months following primary infection. The difference in return rate between COVID and non-COVID patients occurred within the first 6 months. It is possible that COVID-19 is exacerbating underlying medical conditions, requiring more intervention, or an underlying COVID-19 sequelae could be resulting in specific increased complaints amongst infected patients. Further identification of chief complaints at each visit, may help identify if a COVID-19 infection is responsible for a rise in specific complaint following primary infection.

No, authors do not have interests to disclose

EMF 343 Identifying and Addressing Barriers to Emergency Department Buprenorphine Use Across a Health Care System

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Study Objectives: Emergency department (ED) buprenorphine initiation, including buprenorphine administration, prescribing and linkage to outpatient treatment, is an evidence-based practice for the treatment of opioid use disorder (OUD). Unfortunately, implementation remains low. We employed a multiple-methods approach to inform a quality improvement (QI) project to characterize local contextual barriers to implementation and disseminate best practices across a large health care system.

Methods: We retrospectively applied a previously validated electronic health record (EHR) "phenotype" over 18 months from January 2020 – June 2021 to identify ED encounters involving a patient with OUD who would be eligible for treatment with buprenorphine. We then identified patients successfully treated (buprenorphine administration in ED, prescription, or both). We applied the "phenotype" to create an EHR dashboard for ongoing monitoring of buprenorphine treatment rates. We used a combination of surveys and semi-structured interviews to contextualize facilitators and barriers to uptake of ED buprenorphine. Surveys were built using previously validated questions and distributed to ED providers system-wide via REDCap. Interview participants were identified amongst survey respondents and interviews were carried out until thematic saturation was reached. Finally, we developed and distributed modular, asynchronous education targeting identified OUD knowledge gaps and buprenorphine-specific processes.

Results: We identified 1,935 ED encounters in which patients met criteria for OUD. System-wide, 270 (13.9%) encounters resulted in buprenorphine administration and/or prescription. A similar burden of patients with OUD presented at EDs across the system. Despite this, treatment rates varied widely by geographic region and type of ED. (Figure 1) There was no difference in ED length of stay and rates of 30-day patient return between patients who received buprenorphine and those who did not. 139 providers responded to the survey (41% response rate) with all facilities represented. There was considerable heterogeneity in perceptions, barriers, and facilitators for ED buprenorphine, with variation by region. Frequently identified barriers included uncertainty regarding dosing, administration of buprenorphine to pregnant patients, and management of precipitated opioid withdrawal. We then completed 13 semi-structured interviews with physicians and advanced practice providers. Providers described similar barriers as those most commonly identified in the survey. We created 3 educational summaries to address identified areas of need: treatment of pregnant patients, basic buprenorphine pharmacology/dose, and management of buprenorphine precipitated withdrawal. Each summary was 1 page long, consisting of topic highlights with embedded links to pertinent resources. They remain available on an internal continuing medical education Web page accessible to ED providers system-wide.

Conclusion: We utilized a multiple methods approach, combining quantitative and qualitative data to contextualize ED buprenorphine practice patterns across a large health care system. Best practice adherence and barriers to implementation both varied by region, demonstrating a need for focused and practice-specific interventions. This project will facilitate future QI efforts by establishing baseline practice patterns and a platform for ongoing practice monitoring.

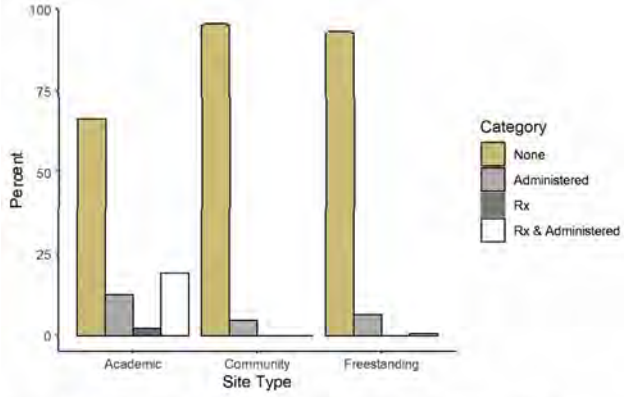

Figure 1. Percentage of ED encounters involving patient with OUD resulting in treatment with buprenorphine, compared by site type

No, authors do not have interests to disclose

344 Direct Patient Impact from a State-Wide Point-of-Care Ultrasound Curriculum in a Distributed Campus Medical School

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Study Objectives: Point-of-care ultrasound (POCUS) offers valuable educational opportunities to undergraduate medical students when integrated into medical school clerkships. However, there remain challenges to the successful implementation of a POCUS curriculum, especially in a distributed campus. The objective of this research was to assess the improvement and expansion of an established POCUS curriculum and to describe patient impact.

Study Design/Methods: This was a prospective observational study that evaluated an educational curriculum and its impact on disease screening. 35 family medicine clerkship sites were invited to participate in the program. Of these, three declined. None of the participating sites performed POCUS exams prior to this program. 32 Philips Lumify Ultrasound Systems were used in 32 clerkship sites. Each site provided students with an ultrasound transducer and an android tablet with an app that was used to upload images to the university's cloud based storage account. Students were required to obtain three different views of the abdominal aorta and an inferior vena cava (IVC) video loop on patients evaluated during their rotation. After obtaining consent from patients, students obtained, deidentified, uploaded, and transmitted images using the provided app and tablet. These images were then scored by medical school ultrasound faculty for completion and accuracy. This study was determined to be exempt by the school's institutional review board.

Results/Findings: Students across the 32 sites were able to obtain adequate POCUS images of the aorta and IVC without on-site assistance from ultrasound–trained faculty. A total of 225 out of 233 students (96.6%) successfully submitted all required images. Of all patients scanned, 13% met screening criteria for an abdominal aortic aneurysm (AAA). Five patients were identified to have a AAA. Of these, all were less than 5 centimeters in diameter. None were ruptured and they were all referred by the on-site faculty for further evaluation.

Conclusion: This study demonstrates the potential for an educational program to have direct patient benefit. To be effective, students must be able to perform the educational task adequately and transmit the image successfully. Our data show that students are able to perform an adequate AAA screening exam without assistance or direct supervision. Another key component for a successful clinically integrated educational program is quality assurance. By having students transmit images to a cloud-based storage system, quality assurance by trained faculty was completed within a few days of image acquisition. This allowed results to be provided to patients in a timely manner and increased acceptance of the educational program resulting in wide spread participation across the state.

No, authors do not have interests to disclose

345 Creating a Deep Learning Classifier for the Detection of Soft Tissue Infections Using Point-of-Care Ultrasound Images

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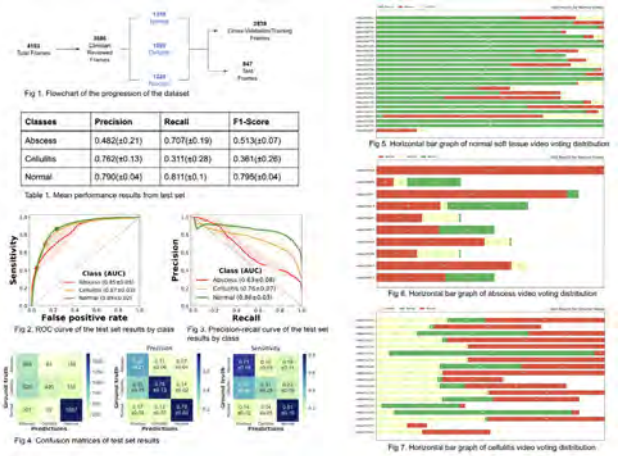
Study Objectives: This was a pilot study with the goal to train and assess the performance of a deep neural network model for automatically classifying ultrasound images into three groups: normal soft tissue, cellulitis and abscess. The purpose is to evaluate feasibility and determine whether this method could be used to support clinicians with difficult to distinguish cases of soft tissue infections.

Study Design/Methods: We performed a retrospective review utilizing an imageset from previously collected ultrasound videos stored in an internal QA repository. Additional information regarding final diagnoses was obtained from clinical information in internal medical records and used as gold standard to classify images to each category of normal soft tissue, cellulitis and abscess. Ultrasound studies were from 77 patients performed by emergency medicine attendings, fellows and residents in the adult and pediatric emergency departments at the Medical University of South Carolina over the years of 2021 to 2022. 218 videos were cropped for homogeneity, and three still frames were sampled per second of video. Frames were reviewed by a clinician to confirm diagnosis. Those that were not representative of the diagnosis were excluded. The deep convolutional network model used was VGG-16, which has been pre-trained on Imagenet. The dataset was split into two parts: a five-fold cross-validation set to train and validate the model to classify frames as normal soft tissue, cellulitis or abscess, and a holdout test set. The test set selected from five patients in each class was used to evaluate the classification performance of the model on a frame-by-frame basis. Additionally, for future clinical application, each test video was classified by aggregating the frame- wise predictions and taking a majority vote of the predicted classes.

Results/Findings: The test set results were obtained using the most common metrics for evaluating machine learning performance (Table 1). A ROC curve, precision-recall curve, and confusion matrices were produced (Figure 2-4). Accuracy for overall frame-based performance evaluation was 0.63. Balanced accuracy was 0.61. For video classification, accuracy achieved was 0.59, excluding one video with tied votes. The voting distribution is visualized with horizontal bar charts (Figure 5-7). Based on both methods of analysis, normal soft tissue was detected the best, with abscess as the second and cellulitis as the worst.

Conclusion: Our pilot study reveals that the use of deep-learning for computer-assisted classification is promising as a tool to be incorporated into point-of-care ultrasound for accurately diagnosing soft tissue infection. The frame-by-frame and video classification accuracies of 0.63 and 0.59, respectively, suggest moderate ability to discern differences between the classes above the chance rate of around 0.33. Worse results for cellulitis and abscess may be due to the overlap or spectrum of characteristics associated with soft tissue infections. Furthermore, there was variability in the number of videos in each class in the test data for the purpose of ensuring videos from a single patient are not also present in the training set. In the future, a larger collection of data may improve the model performance.



No, authors do not have interests to disclose

346 The Coronavirus Disease (COVID-19) May Change Trends of Outcomes Post Out-of-Hospital Cardiac Arrest in Different Hospital Levels: An Updated Trend from 2017 to 2021

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Study Objectives: Out-of-hospital cardiac arrest (OHCA) is a critical condition in the emergency department (ED), which typically has a fatal prognosis. Annually, <20% of patients survive hospital discharge, and 8% have favorable neurological outcomes. Thus, the trend of post-OHCA outcomes remains stably and steadily poor with the rapid acute and critical care medicine development. Reports indicated several factors including resuscitation capability that influence outcome. Established health care institutes and well-trained resuscitation teams directly benefit from these outcomes. An outcome trend was previously reported, but no recent outcome trend (from 2017 to 2021), specifically stratified by hospital levels, has been reported. Remarkably, the coronavirus disease-2019 (COVID-19) pandemic may significantly alter the resuscitation policy and capability of hospital institutes. This study aimed to demonstrate the trend of OHCA outcomes in three different levels of hospitals in the recent 5 years.

Methods: Documented OHCAs from January 2017 through December 2021 in three hospitals (a teaching medical center, an urban second-level hospital, and a rural second-level hospital) were initially retrospectively screened. Eligible adults with nontraumatic OHCAs were enrolled after excluding traumatic OHCA, pediatric OHCA, missing medical records, no cardiopulmonary resuscitation

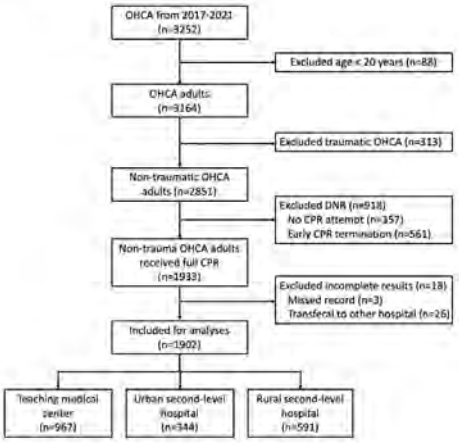
(CPR) attempts, and early CPR termination. The Utstein style variables were reviewed and recorded using the research electronic data capture tool, including age, sex, hospitals, resuscitation events, CPR duration, and charges at ED. The primary outcome was survival to the intensive care unit (ICU) after the sustained return of spontaneous circulation, and the secondary outcomes were survival to hospital discharge and good neurological outcome as defined by a cerebral performance category score (1 or 2). The analysis of variance, Student t-test, and chi- square were used for analysis.

Results: The final analysis included 1,902 patients with OHCA. The mean age was 67.3 years, and males were slightly dominant (60%). CPR was provided to 967 (51%) patients from the teaching medical center, 344 (18%) from the urban second-level hospital, and 591 (31%) from the rural second-level hospital. The trend of survival in the ICU was different from the three hospitals. The rate was stable from 2017 to 2019 (60%) but significantly decreased in 2020 (53%) and 2021 (41%) in the teaching medical center. The rate also decreased during the COVID-19 pandemic in the urban and the rural second-level hospital (38% in 2020 and 46% in 2021; 35% in 2020 and 42% in 2021, respectively).

Additionally, regardless of the teaching medical center or the two second-level hospitals, the rates of survival to hospital discharge and good neurological outcomes decreased after the COVID-19 pandemic, specifically in the teaching medical center (survival to hospital discharge: from 26% to 16%; good neurological outcome: from 18% to 8%).

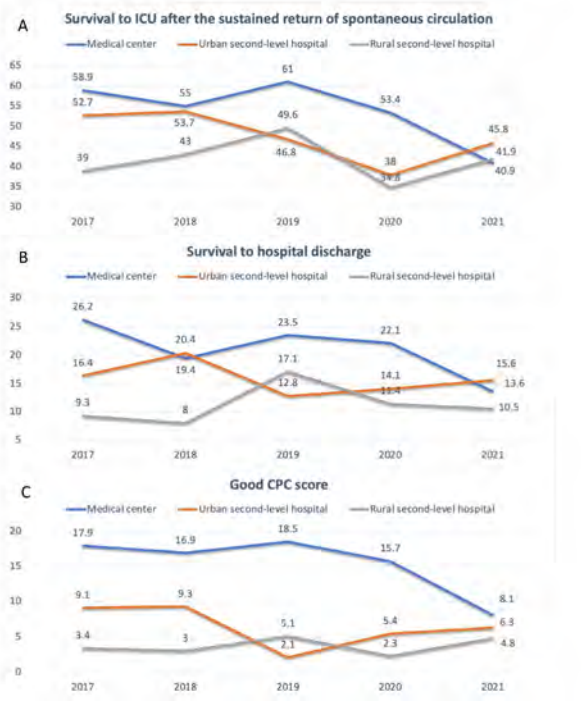
Conclusion: This study elucidates the recent outcome trends in patients with OHCA in the past 5 years. The COVID-19 pandemic changed the patterns of outcome trends and the survival rate to ICU, survival to hospital discharge, and good neurological outcome were extremely similar in different hospital levels, although outcomes in the teaching medical center were superior prior to the COVID-19 pandemic.

Figure 1. Flowchart of patients' recruitment



OHCA: out-of-hospital cardiac arrest; DNR: do-not-resuscitate; CPR: cardiopulmonary resuscitation.

Figure 2. Trends of outcomes in the three different hospitals. 2A: Survival to ICU after the sustained return of spontaneous circulation; 2B: Survival to hospital discharge; 2C: Good CPC score



No, authors do not have interests to disclose

347 The Association of Environmental Factors on Emergency Pediatric Asthma-Related Health Care Utilization

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Study Objectives: Asthma is a multifactorial disease in which complex environmental exposures contribute to asthma exacerbations, often requiring acute medical attention. Although asthma exacerbations follow a seasonal pattern, our ability to precisely predict the timing and magnitude of increased asthma admissions remains limited. Pediatric asthma-related emergency department (ED) visits historically follow a bimodal distribution with peak admissions occurring in the spring and fall, while being lowest during the summer. We aim to identify how the rates of pediatric ED visits for asthma at a large urban medical center are impacted by changes in environmental conditions.

Methods: A time series analysis for pediatric ED visits was analyzed from 1/1/2015 to 2/28/2021 at a New York City ED in a large hospital system (n=8,206). We compared admissions longitudinally relative to the same period the previous years. Here, an ensemble model will be developed using a data assimilation technique to retrospectively parameterize the incidence of asthma admissions using local ED admissions data in addition to viral respiratory illness lab markers, air pollutants, pollens, and meteorological conditions. This retrospective ensemble model is a data assimilation technique commonly applied in numerical weather prediction and has recently been applied to parameterize infectious diseases. Here, we will use it to parameterize the burden of asthma attributable to different environmental factors. To estimate the attributable fraction that respiratory infections and climatic factors such as air pollution or humidity and temperature have on asthma exacerbations, we will use viral lab tests to confirm respiratory infections, meteorological and air pollution conditions will be assessed to identify the

relationship between exposure and exacerbations. The retrospective ensemble model will then be used as the basis for understanding the statistical relationships between the attributable fraction of environmental conditions and pediatric asthma admissions.

Results: The classic bimodal peak for asthma related hospitalizations was not observed during the first year following the COVID-19 pandemic; pediatric asthma-related ED visits decreased by 78% between 3/1/20 and 2/28/21. During the initial 12 weeks following NYC's PAUSE order (March 22nd, 2020), a 92% reduction in admissions was observed, relative to the same period the previous year. Of the 8,206 pediatric patients seen for asthma that came through the ED, 1,827 were admitted to the hospital and 6,379 were sent home, indicating an admission rate of 22%. 18% of patients admitted for asthma had a clinical lab marker sent that returned positive to indicate a respiratory pathogen (positive RVP, etc).

Conclusion: It is important to develop an inference system to provide insight on how changes in behavioral patterns and environmental exposures affect asthma-related health care utilization in order to plan current and future public health interventions in a timely manner. This clinical inference system is augmented here with the additional of an observational system via confirmed respiratory illness, helping strengthen our understanding of the burden of asthma that is attributable to respiratory infections.

No, authors do not have interests to disclose

348 Differences in Antipsychotic and Sedative Administration in Community vs Academic Emergency Departments Across a Health System

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Background: Antipsychotic and sedative medications are commonly used in the emergency department (ED) for a variety of reasons, including procedural sedation and treatment of agitation. Administration of these medications in older adults may result in harm, including increased risk of delirium and falls, but knowledge of practice patterns of administration of these medications to older adults in the ED is limited. The purpose of this study is to characterize the use of parenteral antipsychotic and sedative medications in geriatric patients in the ED and compare utilization at academic and community sites.

Methods: This was a retrospective study conducted in a multi-hospital system including academic and community EDs from March 1, 2019, to March 1, 2020. Inclusion criteria were age 70 or older and parenteral administration of antipsychotic or sedative medication. Exclusion criteria included: continuous infusions and patients undergoing cardiac resuscitation, trauma resuscitation, or procedural sedation. We abstracted data on agents and doses administered. For the two most administered medications, lorazepam, and haloperidol, we recorded whether the dose administered exceeded recommended geriatric dosing for parenteral use (up to 0.5 mg and 1.0 mg, respectively). Summative statistics are reported for academic and community sites and categorical data was compared using Fisher's exact test.

Results: Over the study period, a total of 3,531 doses of parenteral antipsychotic and sedative medications were administered during 2,053 patient encounters to 1,926 individuals. The mean age of included patients was 79 (SD 7.2), and the majority were female (1156, 60%), white (1603, 83%), and reported English as their preferred language (1677, 87%). With respect to medication classes, benzodiazepines were the most commonly administered medication (1898 doses, 54%), followed by antipsychotics (1092 doses, 31%), diphenhydramine (498 doses, 14%), and ketamine (43 doses, 1.2%). Patients in academic EDs were significantly more likely to receive haloperidol and lorazepam and less likely to receive diphenhydramine and midazolam compared to community EDs (see Table). Dosing of haloperidol and lorazepam frequently exceeded recommended geriatric dosing: community EDs were more likely to administer higher doses of haloperidol than recommended (81% vs 70%; p=0.001) but at both academic and community sites, 50% of lorazepam doses exceeded geriatric dosing recommendations (p=0.96).

Conclusion: Older ED patients receiving parenteral antipsychotics or sedatives frequently received multiple agents or doses, and dosing often exceeded recommended geriatric dosing. Differences in prescribing patterns were identified between community and academic EDs. Future research is needed to understand differences in prescribing patterns and whether higher dosing administration was associated with adverse events.

Table: Frequency of specific medication administration in unique patient encounters, stratified by academic versus community emergency department

	Academic ED (n=1099 patient encounters)	Community ED (n=954 patient encounters)	p-value
Diazepam, n (%)	25 (2.3)	10 (1.0)	0.04
Lorazepam, n (%)	911 (83)	734 (77)	<0.001
Midazolam, n (%)	97 (8.8)	121 (12)	0.005
Droperidol, n (%)	4 (0.5)	5 (0.4)	0.74
Haloperidol, n (%)	600 (55)	240 (25)	<0.001
Olanzapine, n (%)	117 (11)	126 (13)	0.07
Diphenhydramine, n (%)	229 (21)	269 (28)	<0.001
Ketamine, n (%)	22 (2.0)	21 (2.2)	0.76

No, authors do not have interests to disclose

EMF

349 Virtual Reality Simulation to Assess EPA-10 in Fourth-Year Medical Students

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Background: Entrustable Professional Activities (EPAs) refers to discrete clinical activities that requires the utilization and integration of various competencies. EPA-10 requires a physician to recognize an unstable patient and initiate evaluation and management. Research has demonstrated that fourth-year medical students are less prepared to manage unstable patients as compared to nonacute conditions. Previous research has demonstrated that simulation-based medical education can improve the acute care skills of medical students and residents. However, high-fidelity (HF) simulation requires expensive equipment and qualified technical support staff. An alternative platform for training and assessing is virtual reality (VR).

Study Objective: As an emerging technology, relatively little research has been published on either the utility or cost effectiveness of VR simulation in medical education. Moreover, no research to date has attempted to study VR simulation assessments of entrustable professional activities in medical students. The project attempts to compare the cost and effectiveness of VR simulation directly with HF simulation as an assessment platform for EPA-10.

Methods: As part of the Emergency Medicine Clerkship at The Ohio State University, all fourth year students participate in a HF simulation performance assessment of an emergent patient (EPA-10). Two of the EPA-10 cases were built on the VR simulation platform SimX and a virtual reality EPA-10 simulation was incorporated into the clerkship. A total of 171 fourth-year medical students were able to participate in both the HF and VR simulated cases. Performance data, cost data, and participant perceptions were collected for both the VR and HF simulations throughout the academic year.

Results: When participants were asked to "Rate the overall quality of this session", the majority of the medical students rated the quality of the VR session either "Very Good" and "Excellent" (M = 3.57, SD = .75). Similarly, the majority of the medical students rated the quality of the HF session either "Very Good" and "Excellent" (M = 3.66, SD = .64). Subjective participant comments included the perceived utility of VR simulation as compared to other educational activities in the clerkship and requests for additional sessions. Constructive criticism focused on the need for a more detailed orientation to the simulated environment. In addition, faculty were asked to assess the

performance of the student participants using the question, "Would you feel confident in this student's ability to manage an acutely decompensating/acutely ill patient with a life threatening illness?" In the VR simulations, 32.7% of students did not meet entrustment, while in the HF simulations, 8.6% of students did not meet entrustment. The difference between these entrustment rates was thought to be multifactorial, but may partially be the result of the VR gameplay learning curve. The cost of the hardware, software licensure and two custom cases was approximately $13,000.

Conclusion: Virtual reality simulation can be used as an effective formative assessment tool for EPA-10 and can function similarly to high-fidelity simulation in this role. Use of virtual reality simulation as a summative assessment of EPA-10 can be considered with caution, as multiple factors can contribute to participant performance and entrustment rates.

No, authors do not have interests to disclose

350 Emergency Department-Based Magnetic Resonance Imaging Utilization and Operational Impact in a Rural, Academic Medical Center: A Single-Center, Retrospective, Observational Study

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Study Objectives: Since many emergency departments (EDs) have limited access to magnetic resonance imaging (MRI), and it is a resource- and time-intensive diagnostic study, understanding its use and impact on ED patient throughput is essential. The objective of this study is to examine MRI utilization over a 5-year period at a rural, academic ED to determine the impact of ED MRI utilization on ED length of stay (LOS) for admitted and discharged patients. A secondary aim was to determine the percent of patients who were taken directly to the operating room based on their MRI results.

Methods: A retrospective study was performed using a de-identified electronic health record dataset at a tertiary, academic ED in the 5 year period between 2017 and 2021. Encounters were selected if an MRI was ordered prior to a disposition order (admit, discharge, admit to operating room). MRIs ordered as part of an ED-based Observation Unit protocol were excluded. Further details about each encounter were queried including final disposition, LOS, and type of MRI. To mitigate the effect of ED boarding on our analysis, we used "provider to disposition decision" as the LOS metric for this study, rather than total time in ED. In this preliminary analysis, we used descriptive statistics to report the impact of MRI utilization on ED throughput. Student's t-testing was used to analyze the difference in LOS based on MRI.

Results: Over the 5-year period, the percentage of ED patient encounters where an MRI was ordered increased from 2.5% in 2017 to 3.7% in 2021. 92% of MRIs ordered from the ED involved brain or spine imaging. Encounters where an MRI was ordered had significantly longer LOS than those where no MRI was ordered, for both patients who were discharged and those admitted from the ED (Fig 1). 53.3% of patients who received an MRI were admitted to the hospital. Less than 1% of patients who had an ED MRI were admitted directly to the operating room (Fig 2).

Conclusions: Our findings support previous studies showing increasing utilization of ED MRI over time and increased ED LOS for patients who receive an MRI. Given the added strain of MRIs on ED throughput, proponents of increasing utilization of ED-based MRIs should have the burden to prove that it improves either patient- centered outcomes (ie, allowing for time-sensitive, emergent diagnoses that change management or disposition) or hospital-wide operational metrics (ie, reducing burden on inpatient capacity by decreasing admissions). Our preliminary data, despite its limitations, do not support either assertion. Less than 1% of patients who received an ED MRI were taken emergently to the operating room. Additionally, over half of patients who received an MRI were still admitted to the hospital after using limited ED treatment space for 40%-150% longer than patients who were not receiving MRI. Our preliminary study is limited in that it is a single-institution study and the LOS metrics are not stratified by Emergency Severity Index (ESI) level, chief complaint, or other potentially relevant factors. Future directions include expanding this preliminary dataset to include multiple academic institutions and to evaluate more specific factors which may help to guide future operational decision-making around the use of ED-based MRI.

Figure 1. ED LOS metrics for patients who are admitted and discharged, with and without ED MRI. (** p < 0.00002; * p <0.001)

Figure 2. Disposition of patients after ED MRI (2017-2021). 0.3% of patients who had MRI were admitted directly to the operating room from the ED. "Other" includes LWBS, AMA, Transfer to other institutions.

No, authors do not have interests to disclose

351 The Accuracy of Handheld Ultrasound in the Evaluation of Symptomatic Pregnant Patients in the Emergency Department

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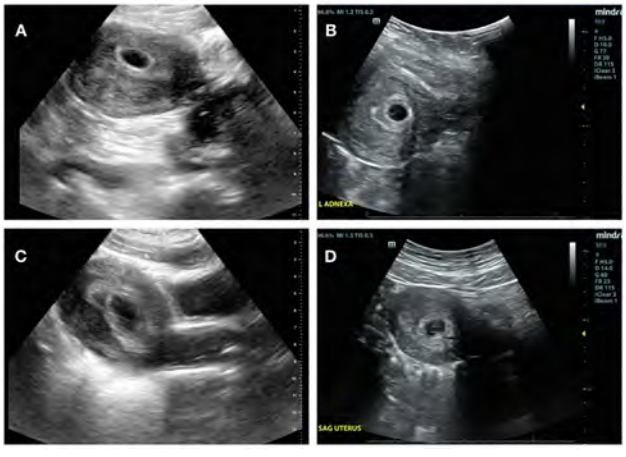
Study Objectives: Ectopic pregnancy occurs at a rate of 19.7 cases per 1,000 pregnancies in North America and is a leading cause of maternal mortality in the first trimester. Traditionally, cart-based ultrasounds (CBU) are used to evaluate for evidence of ectopic pregnancies in emergency settings. Handheld ultrasounds (HHU) have become more widespread in recent years, but their ability to detect intrauterine pregnancy (IUP) compared to traditional cart-based machines is unknown. We aim to compare the accuracy of HHU to CBU for the identification and location of early pregnancy in emergency department (ED) patients.

Study Design/Methods: This was a prospective observational cohort study at a single tertiary care center using convenience sampling. Patients 15 years and older who presented to the ED with pregnancy-related complaints, had a positive pregnancy test, and had not yet obtained confirmatory imaging of their current pregnancy were eligible to be enrolled. Patients were excluded if they were hemodynamically unstable. Experienced clinician sonographers performed a transabdominal ultrasound examination using both a HHU (Butterfly IQ connected to an iPad mini 5th generation) and CBU (Mindray M9 using a curvilinear 2-5 MHz probe) for each patient. The primary outcome was to compare test characteristics of the HHU to the cart-based machine, with CBU used as the gold standard.

Findings/Results: Fifty patients met the inclusion criteria and were enrolled. Mean age was 29 years (range 18-45). Seven (14%) were Caucasian, 32 (64%) Black/African American and 7 (14%) Hispanic. Twenty two patients were found to have an IUP, minimally a yolk sac within a gestational sac, detected with both the HHU and CBU. The median estimated gestational age as measured by ultrasound was 8 weeks (range less than 6 - 27 weeks). In two patients, the CBU was able to identify IUP where the HHU was not. All patients with no IUP detected using the CBU also had no IUP detected using the HHU. Twenty six patients had no IUP detected with both HHU and CBU. Sensitivity and specificity of HHU for IUP were 92% (95CI 73% - 99%) and 100% (95CI 87% - 100%), respectively. The overall diagnostic accuracy of HHU was 96% (95CI 85% - 100%) compared to CBU.

Conclusion: HHU was found to have comparable test characteristics in the diagnosis of intrauterine pregnancy when compared to CBU.

Figure 1: Illustrates images of two false negative cases. A: Patient 1, HHU - Intrauterine sac with no yolk sac B: Patient 1, CBU - Intrauterine sac with yolk sac C: Patient 2, HHU - Intrauterine sac with no yolk sac D: Patient 2, CBU -Intrauterine sac with yolk sac



No, authors do not have interests to disclose

352 Trends in Advanced Practice Providers Provision of High Acuity Emergency Department Services From 2013 to 2019

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Background: Policymakers and researchers have highlighted steady increases in high acuity ED visits over the past decade, notably comprising over two-thirds of ED visits by Medicare fee-for-service beneficiaries. Advanced Practice Providers (APPs) are increasingly providing ED services without concurrent physician evaluation particularly in rural communities, yet it remains unclear if APPs are individually performing high acuity services in the ED setting or simply filling lower acuity care needs. Our objective was to identify trends between 2013 and 2019 in the encounter-level and clinician-level proportion of low and high acuity care provided by three clinician types – emergency physicians, non-emergency physicians and APPs.

Methods: We performed a repeated cross-sectional analysis of emergency clinicians receiving reimbursement for at least 50 Evaluation & Management (E/M) services [99281-99285, 99291] from Medicare Part B within the 2013 to 2019 study years. Consistent with prior work, we defined high acuity ED visits as E/M service codes 99285 and 99291, while defining low acuity as codes 99281-99284. We determined the number and proportion of low and high acuity services performed across clinician types and stratified by clinician rurality.

Results: From 2013 to 2019, 84,477 clinicians performed at least 50 E/M services within one of the study years, including 47,323 Emergency physicians, 10,555 non-Emergency physicians, and 26,599 APPs. At the encounter-level, APPs performed an increasing proportion of low acuity encounters (15.2% in 2013; 20.9% in 2019) and high acuity encounters (4.8% in 2013; 8.8% in 2019) in urban communities. In rural communities, APPs similarly, but to a greater extent, performed an increasing proportion of low acuity encounters (17.1% in 2013; 27.4% in 2019) and high acuity encounters (7.3% in 2013; 16.4% in 2019). Among all Medicare beneficiaries cared for by the average APP, 26.2% of services were high acuity in 2013 compared to 38.1% in 2019. Over the same timeframe, the average Emergency physician saw an increase from 57.8% to 64.4% of services reimbursed as high acuity. Also at the clinician-level, the number of APPs within the emergency workforce providing high acuity services substantially increased from 2013 to 2019. In rural communities, 1,333 APPs performed high acuity services independently in 2013 compared to 2,230 APPs in 2019, representing a 67.3% increase. For comparison, 3,830 Emergency physicians performed high acuity services in 2013 in rural communities compared to 3,698 Emergency physicians in 2019, representing a 3.5% decrease.

Conclusion: At the encounter-level and clinician-level, APPs represent a growing proportion of the emergency workforce providing high acuity services in the ED setting without concurrent physician evaluation. Particularly prominent in rural designations, these findings draw attention to a growing reliance on APPs to perform high acuity services and warrant consideration of new care delivery and education models.

No, authors do not have interests to disclose

353 The Use of Simulation Ultrasound to Train Emergency Clinicians in Transvaginal Ultrasound

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Study Objectives: Pelvic ultrasound is useful for rapid triage and diagnosis of emergency department (ED) patients in their first trimester of pregnancy who present with vaginal bleeding or abdominal pain. The objective of this study was to measure comfort and competency levels with transabdominal and transvaginal ultrasound before and after a brief educational session using transvaginal simulation training to assess the efficacy of the intervention.

Methods: Transvaginal ultrasound simulation sessions were held during the ultrasound fellowship conference, emergency medicine residency conference, and as a faculty development session. The course length was 60 minutes and included both didactics and hands-on simulation in addition to pre- and post-intervention surveys. We assessed participants, previous experience with transabdominal and

transvaginal ultrasound, and comfort levels teaching, performing, interpreting, and clinically integrating each modality via visual analog scales. We also assessed competency with interpreting images from each modality pre- and post-intervention.

Results: Thirty-eight emergency clinicians participated in the intervention (4 ultrasound fellows, 1 other fellow, 7 attendings, 1 physician assistant, and 25 residents). Participants were 39% female, had a median 2.5 (IQR 5.75) years of experience in clinical practice, and an ultrasound education range of no training to completed ultrasound fellowship training. The range of experience was from 0 to >300 transabdominal scans and 0 to 100 transvaginal scans. Twenty-two participants (58%) completed the post- intervention survey and competency assessment and were included in the final analysis. Pre- and post- comfort levels and competency scores were compared using a student's t-test. Comfort with teaching, performing, interpreting, and clinically integrating pelvic ultrasound increased significantly after the training (all p-values <0.0009). Competency test scores also improved post intervention (p=0.000001).

Conclusions: In our cohort of EM clinicians with varying levels of clinical and ultrasound experience there was a statistically significant increase in comfort levels teaching, interpreting, and integrating transabdominal and transvaginal pelvic after a brief educational intervention. Continued simulation interventions geared toward weak points in clinical practice may lead to significant improvements in patient care.

No, authors do not have interests to disclose

354 Impact of Shared Visits With Midlevel Providers or Residents on Resource Use and Admission Rate

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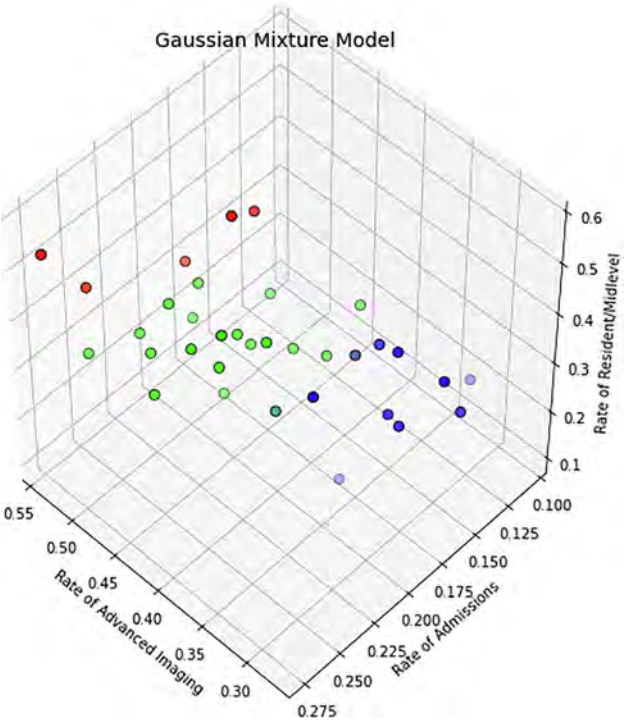
Background: Variability exists in emergency physicians (EP) resource utilization as measured by ordering practices, propensity to admit patients, and whether a visit is shared with a resident or midlevel provider (nurse practitioner or physician assistant).

Study Objective: To validate and expand upon prior data suggesting that visits shared with a midlevel or resident influence EP behavior as measured by resource use and propensity to admit a patient.

Methods: This is a retrospective study of routinely gathered operational data from two community, suburban hospitals within an academic emergency network. We analyzed 34 EPs with 141,433 patient visits from July 1, 2016 to June 30, 2019. We collected individual EP data on advanced imaging (CT, US, MRI), admission rates, and whether a visit was shared with a midlevel or resident for each patient encounter. To investigate whether there might be distinct groups of practice patterns relating these resources, we used a Gaussian Mixture Model (GMM), a classification method used to determine the likelihood of distinct subgroups within a larger population. The total number of groups and covariance structure were determined by Bayesian Information Criteria.

Results: Our GMM revealed three distinct groups of physicians based on their ordering practices. The largest group is characterized by a homogenous pattern of neither high or low resource utilization (n=19, 58% female, median years' experience: 9 [IQR 2-16]; rates of Advanced Imaging: 44%, Admission: 21%, Midlevel/Resident staffing 35% with a modest group of low-resource users (n=10, 0% female, median years' experience: 7 [IQR 5-11]; rates of Advanced Imaging: 31%, Admission: 17%, Midlevel/Resident staffing 32%), and far fewer members of a high-resource use group (n=5, 20% female, median years' experience: 15 [IQR 5-16]; rates of Advanced Imaging: 49%, Admission: 22%, Midlevel/Resident staffing 35%) [Figure 1]. This variation suggests that use of advanced imaging and propensity to admit may be influenced by whether a patient visit is shared with a midlevel or resident provider.

Conclusions: At two community EDs, three distinct subgroups of EP ordering practices exist based on advanced imaging use, propensity to admit a patient, and whether a visit was shared with a midlevel or resident. This data validates prior work showing that resource utilization and admission rates are related, while demonstrating that more nuanced patterns of EP ordering practices exist based on whether a visit is shared with a midlevel or resident provider. Further investigation is needed to understand the impact of EP characteristics and behavior on throughput and quality of care.



No, authors do not have interests to disclose

355 Using Hierarchical and Cognitive Task Analysis to Develop an Assessment Checklist for Ultrasound-Guided Fascia Iliaca Nerve Block Procedures

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Study Objectives: In the emergency department, ultrasound-guided fascia iliaca nerve block (UGFINB) procedures are increasingly used in elderly patients with hip fractures because of its efficacy in providing analgesia efficiently and safely while minimizing opioid use. This study aimed to develop and gather initial validity evidence of a checklist for UGFINB procedures for the purpose of training and assessment in order to optimize clinical competence.

Methods: We applied two human factors methodologies: hierarchical tasks analysis (HTA) and cognitive task analysis (CTA), to elucidate expert consensual knowledge, build a procedural process model, and understand the cognitive processes involved during the performance of UGFINB procedures by emergency physicians. An initial HTA was constructed after referencing textbooks, peer-reviewed publications, video recordings, Web pages, and expert panel discussions. HTA was further refined, and a CTA was conducted through a series of semi-structured interviews with 10 subject-matter experts (US-trained Emergency physicians). CTA was built upon the hierarchical segmentation of UGFINB procedure, and a cued-recall protocol using video and photo vignettes, prompting experts to analyze the process model and elaborate on their clinical practice, including variations from the initial HTA and related cognitive processes (decision- points, critical communications, potential pitfalls, and problem solving/mitigation strategies).

Results: The initial HTA for UGFINB procedure presented to the subject-matter experts had a total of 3 phases (pre-procedure, intra-procedure, and post-procedure), 17 steps and 37 substeps. EM and human factors researchers reviewed the 10 HTA/CTA interview recordings and created an inclusive list of the procedural steps, substeps and cognitive processes, integrating all datasets from the interviews. Consensus between the researchers was subsequently used to eliminate repeated HTA/CTA elements. The final UGFINB process model

revealed a total of 106 checklist elements, in which 3 are new steps and 103 are new substeps.

Conclusion: A comprehensive process model was created for UGFINB procedures using human factors techniques. This procedural process model will be further refined by a Delphi panel to generate an objective tool to assist procedural training and competency assessment in a variety of clinical and educational settings. The approach used in this study can be used to create and validate additional assessment and training tools for other ultrasound-guided emergency procedures.

No, authors do not have interests to disclose

356 Frequency, Test Characteristics, and Patient Demographics Associated With Lab and Imaging Results Viewed in the Emergency Department During Encounters

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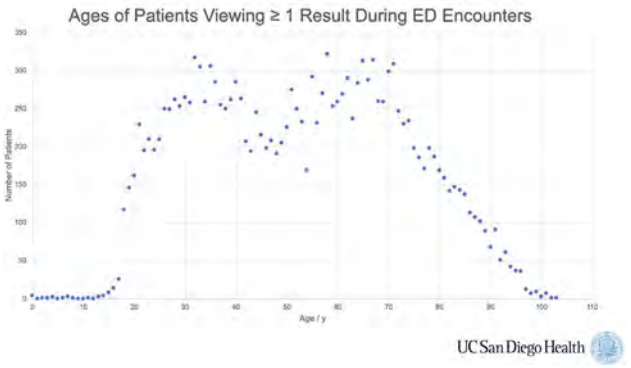
Study Objectives: The 21st Century Cures Act legislation included provisions regarding "information blocking," which stated that with few exceptions, final laboratory and imaging results must be made available to patients at the same time that they are made available to providers. Little is known about how frequently patients access their lab and imaging results during an emergency department (ED) encounter. The objective of this study was to describe the frequency with which patients access lab results, which patients choose to access lab results, and which types of results were accessed while an emergency encounter is in progress.

Methods: We executed a retrospective analysis of patients presenting to two EDs over an approximately one– year period (May 1, 2021 – May 11, 2022). We collected information on all unique lab and imaging results (excluding repeat views) from an ED encounter that were viewed by patients during that same encounter. We examined the frequency with which results were viewed, types of results viewed, and the demographics of patients viewing results during ED encounters.

Results: During the study period, there were 108,969 ED encounters, from which patients viewed results at least once in 16,608 encounters (15.2% of the total). Overall, there were 119,619 unique lab or imaging results viewed by patients. Lab results constituted 103,232 unique views (86.3%), with the remainder being imaging results (16,387, 13.7%). With respect to the patients who chose to view their results during their ED encounter, 59.8% identified as female, and the mean (with standard deviation) and median ages respectively were 52.8 (± 20.0) and 53 years. The overall age distribution had two peaks, at 32 and 58 years.

Conclusion: Among patients presenting to two large academic EDs, a substantial number chose to view their lab and imaging results during their ED visit, with the majority of patients doing so identifying as female and the mean and median age of patients approximately 53 years. This information may be useful to ED providers going forward, given the potential for a substantial, and as of yet incompletely understood, impact on ED provider workflow of patients viewing their results amidst an ED encounter.



No, authors do not have interests to disclose

357 Implementation of a Behavioral Health Paramedic Program for Crisis Navigation

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Background: The heavy burden of behavioral and mental illness on emergency systems is a nationally and internationally recognized problem and can be exacerbated in communities with higher concentrations of people experiencing housing insecurity, psychiatric illness, and substance use disorders. In Alameda County, CA, about ten percent of all EMS encounters result in placement of an involuntary psychiatric hold. Further, patients who at some point required an involuntary hold due to acute exacerbations of their mental illness or substance use (10% of all EMS patients) accounted for a greatly disproportionate fraction (24%) of all EMS encounters. To decrease the burden on EMS and EDs, as well as to better serve this patient population, some EMS systems have trialed non-traditional responses for behavioral health emergencies, including formation of interdisciplinary teams and direct transport to psychiatric facilities.

Study Objective: This study describes the design, implementation and initial outcomes of a behavioral health paramedic response program for a suburban 911-system.

Design: Alameda is an island city neighboring Oakland in Alameda County, CA and has almost 80,000 residents. Alameda Fire Department is its sole EMS provider, and in December of 2021, it implemented its first behavioral paramedic program in partnership with Alameda Family Services (AFS), which is a community-based organization offering mental health as well as wrap-around social services. The ACT response unit operates 24/7 and consists of an EMT and Behavioral Paramedic, who has undergone a specialized training program designated by the county, and who is authorized to place patients on involuntary psychiatric holds. This unit is activated after dispatch determination of a behavioral health call with a "client" who is cooperative and without medical or traumatic complaints. AFS supplements this response with around-the-clock consultation services by a licensed behavioral health clinician, as well as follow-up case management. All involuntary holds placed by the Behavioral Paramedic require clinician consultation.

Outcomes: After ACT program implementation (reporting period Dec 16, 2021 – Feb 16, 2022), the frequency of transportation to an ED dropped to less than one fourth pre-program levels; transportation to psychiatric facilities dropped by more than half. Furthermore, over 50 percent of EMS responses for behavioral health complaints became non-transports, and drop-offs to alternative destinations increased. There were no major adverse patient outcomes identified.

Conclusion: A behavioral health paramedic program, with interdisciplinary behavioral health clinician support can be a safe and effective response model for behavioral health emergencies in EMS.

No, authors do not have interests to disclose

358 The Impact of COVID-19 on Diabetic Ketoacidosis Patients

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Background: Diabetics have worse outcomes once infected with COVID-19. Diabetic ketoacidosis (DKA), a potentially lethal complication of diabetes, was recently described in 110 COVID-19 patients with a 45% mortality rate in a systematic review by Pal et al. of 19 case series. Yet case series cannot describe an association, much less a cause-and-effect relationship between COVID-19 and DKA.

Study Objective: Describe the prevalence/outcomes of DKA patients comparing pre- (March-April 2019) and pandemic (March-April 2020) periods.

Methods:

Design: Retrospective cohort of admitted pandemic DKA/COVID-19+ patients comparing prevalence/outcomes to pre-pandemic DKA patients using electronic health record Setting: Eleven hospitals of New York City Health & Hospitals. Participants: Inclusion: Pandemic period: admitted COVID-19+ patients (>18 years). Pre-pandemic period: admissions (>18 years) selected through the medical record.Exclusion: transfers during both periods. Exposure(s): COVID-19+ by PCR testing. Main Outcome(s) and Measure(s): Mortality: death during the index hospitalization. Demographics, medical

histories and triage vital signs, and laboratory tests. Definition of DKA: Beta-Hydroxybutyrate (BHBA) (> 0.4 mmol/L) and bicarbonate (< 15 mmol/L) or pH (< 7.3). Statistical Analysis: The data were reported as means or counts and percentages with 95% confidence intervals. Group comparisons were analyzed by Student's t-tests or Fisher's Exact Test, where appropriate, and odds ratios to predict mortality.

Results: Demographics and past medical histories were similar during the pre-pandemic (n=6938) vs. pandemic (n=7962) periods (Table 1). DKA prevalence was greater during pandemic (3.14%, 2.66-3.68) vs. pre-pandemic period (0.72%, 0.54-0.95) (p>0.001). DKA/COVID-19+ mortality rates were greater (46.3% (38.4-54.3) vs. pre-pandemic period (18%, 8.6-31.4) (p<0.001). Surviving vs. non-surviving DKA/COVID- 19+ patients had more severe DKA with lower bicarbonates by 2.7 mmol/L (1.0–4.5) (p<0.001) and higher both Anion Gaps by 3.0 mmol/L (0.2-6.3) and BHBA by 2.1 mmol/L (1.2–3.1) (p<0.001) (Table 2). There was an increased odds of dying for patients with DKA and COVID-19 for the following parameters: O2 Sat. < 95%, OR 9.27 (4.09 - 21.05) (p<0.001); Sys. BP < 100 mmHg OR 9.98 (4.17 - 23.89) (p< 0.001); BUN > 20 mg/dl OR 2.53 (1.11 - 5.77) (p=0.040); and Cre > 0.9 mg/d OR 5.07 (1.40 - 18.39) (p=0.015).

Discussion: We found that COVID-19 had significant impacts on DKA patients. Comparing our pre- to pandemic periods, we found a greater than a 4+-fold increase in DKA prevalence (0.72% vs. 3.14%) with a 2+times higher DKA/COVID-19+ mortality rate (46.3% vs. 18.0%). Comparing DKA severity pre-and pandemic periods, we found similar pH, bicarbonate, beta-hydroxybutyric acid levels. High mortality rates of DKA/COVID-19+ were associated with COVID-19 biomarkers of lower oxygen saturations and blood pressures, higher degrees of renal insufficiency with higher SOFA and qSOFA scores, not DKA severity.

Conclusion: We found a strong association of COVID-19 with the increased prevalence of DKA. We suggest screening all COVID-19+ patients for DKA with Beta-hydroxybutyric acid testing. If another COVID-19 surge occurs and ICU beds are limited, prioritizing DKA/COVID-19+ with renal insufficiency, low oxygen saturation, or blood pressure is reasonable compared to those without these markers.

TABLES, ILLUSTRATIONS, FIGURES:

Table 1. Demographics and Initial Vital Signs of Admitted Patients Pre- Versus Pandemic Timeframes

Characteristic	Pre-Pandemic (n=6938)	Pandemic (n=7962)
Study Periods	March 1 - April 27, 2019	March 1 - April 27, 2020
Age (yrs.)	59.40 (58.95 - 59.85)	62.73 (62.37 - 63.09)
Gender (m) (n,%)	3964, 57.1%	4799, 62.4%
Race (%)		
Other	40%	49%
Black	29%	34%
White	22%	11%
Asian	9%	6%
American Indian or Alaskan	0%	0%
Other Pacific Islander	0%	1%
Ethnicity (%)		
Non-Hispanic	57%	45%
Hispanic	28%	38%
Unknown	8%	13%
Asian	6%	4%
Past Medical History (%)		
Hypertension	67.55%	72.56%
Diabetes	52.61%	60.51%
Cardiac	43.94%	36.13%
Pulmonary	41.19%	33.68%
Endocrine (Non-DM))	27.42%	27.85%
Renal	19.35%	20.61%
Psychiatric	18.04%	13.75%
Cancer	13.66%	9.00%
Neurologic	10.29%	5.74%
Gastrointestinal	7.90%	3.94%
AIDS / HIV	3.92%	2.75%
Other	45.15%	23.03%

Table 2. Demographics and Initial Labs COVID-19 Positive Patients with Diabetic Ketoacidosis Survivors versus Non-Survivors

Characteristics	Survivors (n=79)	Non-Survivors (n=68)	p-Value
Age (years)	53.9 (50.1 - 57.9)	64.2 (60.3 - 68.1)	< 0.001*
Gender (m%)	58.2% (47.2% - 68.5%)	69.2% (57.3% - 78.9%)	0.231**
BMI	28.2 (26.3 - 30.10	28.7 (26.9 - 30.5)	0.602**
Temperature (F°)	98.4 (98.1 - 98.7)	98.9 (98.1 - 98.7)	0.700*0
Heart Rate (B/min)	88.2 (84.8 - 91.6)	96.2 (88.9 - 103.4)	< 0.001*
Systolic Blood Pressure (mmHg)	123.8 (119..6 - 128.0)	95.1 (87.3 - 102.8)	< 0.001*
Diastolic Blood Pressure (mmHg)	72.3 (68.4 - 73.1)	50.3 (45.9 - 54.9)	< 0.001*
Respiratory Rate (B/min)	19.0 (18.4 - 19.6)	23.0 (21.4 -24.6)	< 0.001*
Oxygen Saturation (%)	97.0 (96.5 -97.5)	86.9 (83.2 - 90.6)	< 0.001*
SOFA Score	1.35 (0.81 - 1.89)	5.54 (4.41 - 6.68)	< 0.001*
qSOFA Score	0.29 (0.17 - 0.42)	1.24 (1.04 - 1.43)	< 0.001
pH	7.17 (7.14 - 7.20)	7.20 (7.17 - 7.23)	0.413**
Bicarbonate (mmol/L)	12.17 (10.95 - 13.39)	14.92 (13.67 - 16.21)	< 0.001
Anion Gap (mmol/L)	26.2 (23.9 - 28.4)	23.2 (20.8 -25.5)	< 0.001
Beta-Hydroxybutyrate (mmol/L)	6.09 (5.42 - 6.76)	4.04 (3.28 - 4.80)	< 0.001
Lactate (mmol/L)	2.94 (2.05 - 2.94)	3.48 (2.45 - 4.51) (	0.251**
Glucose (mg/dl)	505 (456 -572)	563 (484 - 642)	0.225**
Sodium (mmol/dl)	137.7 (137.7 - 141.6)	141.5 (138.8 - 144.2)	0.311**
Potassium (mmol/dl)	4.64 (4.62 - 5.21)	5.20 (4.92 - 5.48)	0.099**
Blood Urea Nitrogen (mg/d)	46.5 (37.0 - 55.9)	63.4 (54.1 - 76.6)	< 0.001
Creatinine (mg/dl)	2.58 (1.85 - 3.31)	3.50 (2.76 - 4.23)	< 0.001
White Blood Cell Count (10³/L)	13.30 (11.90 - 14.71)	11.61 (10.22 - 13.04)	0.081**
Hemoglobin (g/L)	14.22 (13.69 -14.75)	12.79 (12.29 - 13.66)	< 0.001
Hematocrit (%)	45.2 (43.4 - 46.6)	41.7 (39.1 - 44.2)	< 0.001
Platelet Count (10³/L)	294 (268 -320)	264 (236 291)	0.093**

- * p < 0.05, ** NS

No, authors do not have interests to disclose

359 The Impact of an Experiential Social Medicine Curriculum in a County Emergency Medicine Residency Training Program: A Mixed Methods Study

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Introduction: Social medicine (SM) is an emerging field which focuses on the study of the social determinants of health. Despite widespread acknowledgement of its influence in patient care, SM is underemphasized in graduate medical education. Attempts to incorporate SM into residency curricula have shown promising results, though the impact of SM curricula and how to incorporate curricula into emergency medicine (EM) residency remains unclear.

Study Objective: We developed an experiential SM curriculum for residents and evaluated the impact of the curriculum on residents' attitudes toward and care of vulnerable populations.

Study Design/Methods: In 2018-2019, all 73 residents at our EM Residency Program were invited to participate in a series of experiential electives focused on patients from six vulnerable subpopulations: persons experiencing substance use disorders, experiencing homelessness, seen at a border health clinic, seeking asylum, facing primary care access barriers, involved in the Violence Intervention Program (VIP), or involved with the carceral system. Participation was voluntary. Experiences were coordinated with community-based organizations. We invited participants to complete a voluntary, anonymous post-rotation electronic survey exploring changes in their attitudes and competence.

One year after the conclusion of the SM elective, we conducted semi-structured interviews with a convenience sample of seven participants to explore a deeper understanding of the SM experience and to probe for any change in attitudes.

Interviews were audio-recorded, de-identified, and transcribed. Two authors (HV, LS) performed a reflexive thematic analysis of resulting transcripts.

Results: Of the 38 residents who participated in electives, 22 completed the survey (58%). Overall, participants reported increased understanding, satisfaction, empathy, perceived responsibility, and perceived competence towards working with vulnerable populations after their elective (Table 1). Both patient- and resident-oriented themes were identified in the interviews (Table 2). First, participants reported increased understanding of the health care challenges faced by vulnerable populations as well as increased empathy. Participants also reported perceived increased confidence and clinical competence when caring for these patients, as the experiences "made it easier to come back and work in the setting that I was working in and be able to bring lessons from both to each place." Many residents noted that the SM elective provided a sense of rejuvenation, as "it re-inspired some of those folks or at least made those conversations a bigger part of every shift." The SM elective also was integral in career development. One participant voiced, "I'd like to be involved in health system development or community outreach or something at least part time for my career." Finally, participants offered suggestions for future iterations of the elective, such as bringing in more community partnerships and a hybrid curriculum.

Conclusion: Our experiential SM curriculum positively impacted residents' attitudes and informed their care of vulnerable populations. It also empowered residents on an individual level in addressing the social determinants of health on shift. Given the pervasive impact of the social determinants of health in the practice of EM, it may be useful for residency program leaders to integrate experiential electives into existing residency curricula.

Table 1. Aggregate post-elective experience survey scores by domain

Perceived Attitudes (N=22)

Compared to how you felt prior to this elective, how would you rate your:	1 = Strongly Decreased	2 = Decreased	3 = Unchanged	4 = Increased	5 = Strongly Increased
Understanding of healthcare challenges faced by *?	0 (0%)	0 (0%)	0 (0%)	12 (54.5%)	10 (45.5%)
Ability to empathize with *?	0 (0%)	0 (0%)	0 (0%)	9 (40.9%)	13 (59.1%)
Sense of satisfaction when treating *?	0 (0%)	0 (0%)	0 (0%)	9 (40.9%)	13 (59.1%)
Sense of frustration when treating *?	0 (0%)	6 (27.2%)	9 (40.9%)	3 (13.6%)	4 (18.1%)

Perceived Responsibility #2 (N=22)

Compared to how you felt prior to this elective, how would you rate your level of agreement with the following statement:	1 = Strongly Disagree	2 = Disagree	3 = Neutral	4 = Agree	5 = Strongly Agree
Emergency physicians are responsible for identifying and intervening on social determinants of health for *.	0 (0%)	1 (4.5%)	1 (4.5%)	6 (27.2%)	14 (63.8%)
There is a LOT that I can do to help *in the emergency department	0 (0%)	1 (4.5%)	4 (18.1%)	10 (45.5%)	7 (31.8%)

Perceived Competence (N=21)

Compared to how you felt prior to this elective, how would you rate your:	1 = Strongly Decreased	2 = Decreased	3 = Unchanged	4 = Increased	5 = Strongly Increased
Knowledge of the social support services and/or resources available to * at our institution?	0 (0%)	0 (0%)	5 (23.8%)	10 (47.6%)	6 (28.6%)
Ability to identify the social determinants of health that are contributing to a(n) * presentation?	0 (0%)	0 (0%)	2 (9.5%)	13 (61.9%)	6 (28.6%)
Ability to establish a therapeutic alliance with *?	0 (0%)	0 (0%)	3 (14.3%)	11 (52.4%)	7 (33.3%)
Ability to intervene on the social issues that are contributing to a(n) * presentation?	0 (0%)	1 (4.8%)	5 (23.8%)	11 (52.4%)	4 (19.0%)

*Data are reported n(%). *Patients experiencing substance use disorders, experiencing homelessness, seen at the border health clinic, seeking asylum, facing primary care access barriers, involved in the Violence Intervention Program (VIP) at our hospital, or involved with the carceral system.*

Table 2. Themes from Semi-Structured Interviews (N=7)

Themes	Supporting Quotes
1. Patient-Oriented Themes	
A. Residents reported a deeper understanding into the healthcare challenges faced by *.	a. "For the most part, it's been helpful to just understand what the landscape looks like in the Los Angeles area and get a sense of that... Certainly having a better understanding of what community resources were out there and some of the challenges facing the LA population specifically was helpful because I have [now] a little more literacy to know what the landscape is when we have to refer out." (Transcript 4)
B. Residents reported increased perceived confidence when caring for *.	a. "I think, especially for asylum work, it sounds really intimidating to be writing these affidavits and you're doing these interviews, and it sounds (at least to me) really daunting - like "oh my god that's intense, I don't know if I'm cut out for that," but then getting to see that this is a very achievable process and it's not so bad." (Transcript 1) b. "I think there were times that things felt comfortable or more comfortable or I felt more confident because people would come back and clearly have used the needles that we did gave out for harm reduction or tell us about how they saved someone's life with the Narcan." (Transcript 7)
C. Residents reported increased perceived clinical competence when caring for *.	a. "I think it's changed the way that I'm able to plug patients into care and safely discharge patients and kind of recognize needs, as well." (Transcript 3) b. "Obviously we're talking orders of magnitude difference, but I think the mindset of having to fight those fights a lot for patients really allows it or makes it easier to get involved with the wound clinic and also made it easier to come back and work in the setting that I was working in and be able to bring lessons from both to each place." (Transcript 7)
D. Residents reported increased motivation when caring for *.	a. "So it's been only positive I feel in terms of motivating on-shift compassion and feeling, you know empowered to actually make a difference - even if it's not supported from top down. I think there are a lot of us who care and who kind of share best practices with each other." (Transcript 2)
E. Residents reported increased empathy when caring for *.	a. "But you know I think when you understand where people come from, where their backstory is, or why people go to Tijuana for random medications and things, or what Tijuana is actually like, what the health care system there is like, what access our undocumented patients have, or what issues and barriers they face, it makes you more compassionate when they show up to the emergency department because you understand how limited they are." (Transcript 2)
F. Residents reported frustrations when caring for *.	a. "But I think it's really frustrating when it feels like every day in the emergency department, I don't get to be the doctor that I want to be because our current system and pathways just don't care to address some of these issues that our patients face. So I end up spending a lot of extra time, trying to find and print out resources for patients or trying to explain to patients the different opportunities that they have for healthcare or for follow up or for legal services...It sucks to feel as though you are an actor in a system that doesn't really serve our patients well. And it's out of your control." (Transcript 2) b. "Another hard thing was just the recognition that you can help, but you can't fix everything, which is something that we are all aware of every day." (Transcript 5)
2. Resident-Oriented Themes	
A. Residents reported that the elective helped career development.	a. "I think it's maintained my interest in social emergency medicine. I think it's actually made me a little bit more interested in administrative work as well, and using those two pathways to go down a joint mission together - to use systems to improve access to care and to improve social emergency care for patients." (Transcript 3) b. "I was using [the elective] to confirm that I did want to stay involved in that space... it changed my career goals in that it just solidified that I do want to keep working with this patient population." (Transcript 5)
B. Residents reported a sense of rejuvenation with the elective.	a. "It's really inspired me to make sure I'm involved in that and really mindful about allocating time and energy for that in the future and funding if I can. It's definitely made it something that I definitely want to be a part of more." (Transcript 1) b. "I think it was a huge rallying point for a lot of folks. Also I think it brought people out of the woodwork or back from the brink - people who might have been disillusioned or kind of lost sight of some of the reasons why they showed up to do the work every day. It re-inspired some of those folks or at least made those conversations a bigger part of every shift or allowed it to come back to spaces that might have been inhabited by complaining about schedules or talking about other things related to clinical work and residency." (Transcript 7)
C. Residents enjoyed the sense of ownership with regards to curriculum development.	a. "I think the other thing that I didn't bring up that's really awesome to see over the last few years too and it's been kind of cool to see develop is how the curriculum has really been championed by the people who want to learn in that curriculum. I feel like a lot of the so-called learners or residents are the people who are designed to gain something by going through it have also added a lot to it. And so it's been this very awesome reciprocal relationship that is just allowing it to snowball. It's kind of like a really beautiful thing. I can't really think of any other curriculum that I've been a part of, as a student that I've seen grow like that where people are really growing it from the bottom up as they're partaking in it. It almost feels like a potluck in some ways, which is kind of cool." (Transcript 7)

**Patients experiencing substance use disorders, experiencing homelessness, seen at the border health clinic, seeking asylum, facing primary care access barriers, involved in the Violence Intervention Program (VIP) at our hospital, or involved with the carceral system.*

No, authors do not have interests to disclose

360 Pneumorachis and Pneumocephalus Following Penetrating Thoracic Trauma: A Case Report

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Introduction: Pneumorachis and pneumocephalus are uncommon entities most often seen as iatrogenic findings following surgery. Pneumorachis associated with pneumocephalus following penetrating thoracic trauma is an especially rare clinical occurrence. This case report provides a rare presentation of traumatic pneumorachis with pneumocephalus and presents a review of its causes and management.

Case Presentation: A 50-year-old male presented following a gunshot wound to the thoracic back. The trauma survey was notable for decreased breath sounds along the chest with associated crepitus, for a 1cm penetrating wound to the right lateral thoracic back, for a midline thoracic spinal deformity, for decreased rectal tone, and for lack of gross motor function to the bilateral lower extremities. The patient was combative throughout the survey and was ultimately intubated in order to maintain spinal integrity and to expeditiously provide treatment. Initial ultrasound and X-ray imaging demonstrated

hemopneumothoraces that were treated with bilateral chest tubes. CT imaging showed extensive pneumocephalus without calvarial fracture, pulmonary lacerations, comminuted rib fractures, and a comminuted fracture of the posterior elements of the T7 vertebra with multiple fragments seen within the spinal canal causing severe central canal stenosis as well as air tracking upward and downward from the T7 level. The Neurosurgery service was consulted and noted that the fracture was a transection injury that did not require emergent neurosurgical stabilization. Neurosurgery reflected on the rarity of the finding of pneumocephalus and pneumorachis, noting that it was likely due to a spinal-pleural fistula. In conference with the Trauma Surgery service, the Neurosurgery service recommended consultation with a Cardiothoracic Surgery service to assess the possible need for pleural repair. Ultimately, the patient was transferred to an outside hospital with a cardiothoracic surgery service.

Discussion: Pneumorachis is precipitated by several etiologies that can be categorized by the various pathways of air entry into the spinal canal. These include pneumorachis associated with intracranial injury (ie skull fractures following assault), pneumorachis associated with injury to the respiratory system (ie pneumothorax following motor vehicle accident), pneumorachis after injury to the intra-abdominal viscera (ie emphysematous pyelonephritis), pneumorachis from a spinal source (ie epidural abscess), and spontaneous pneumorachis. The treatment of pneumorachis is geared toward treatment of the precipitating injury (ie pneumothorax with chest tube placement, epidural abscess with laminectomy and antibiotics). Indeed, aggressive evacuation of the pneumorachis itself is rarely attempted. Pneumorachis generally reabsorbs spontaneously with the air being passed directly into the blood. Oxygen therapy is often employed as an adjunct treatment with the aim of facilitating air absorption. In a survey of cases by Chaichana et al, the vast majority of cases resolved with conservative management.

Conclusion: Pneumorachis with pneumocephalus following thoracic trauma is an exceptionally atypical clinical presentation and its management is, in turn, lightly codified. Even so, a review of the literature appears to support treatment strategies that address the underlying cause of the errant air while conservatively managing the pneumorachis itself with observation.

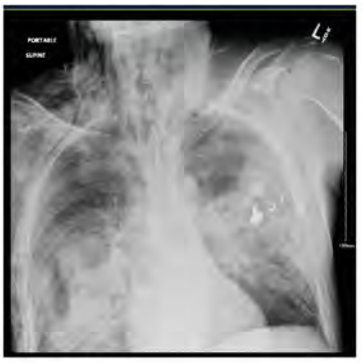


Image 1: Initial chest radiograph showing extensive emphysema along chest and neck, with diffuse bilateral lung opacities, and retained foreign bodies in left chest.

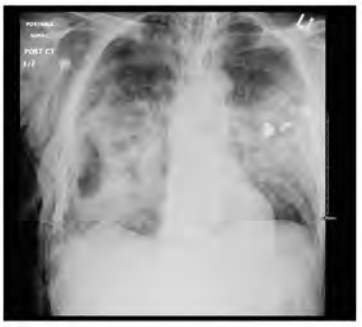
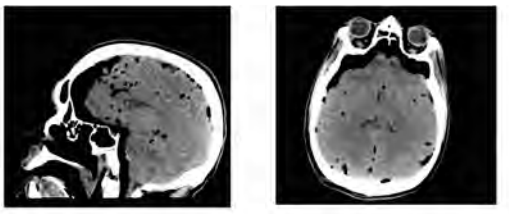
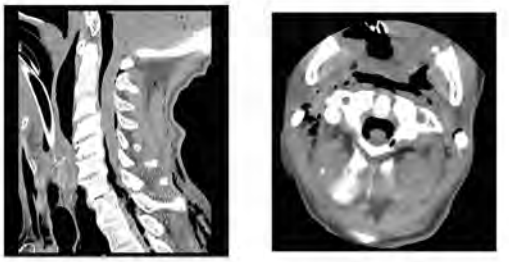


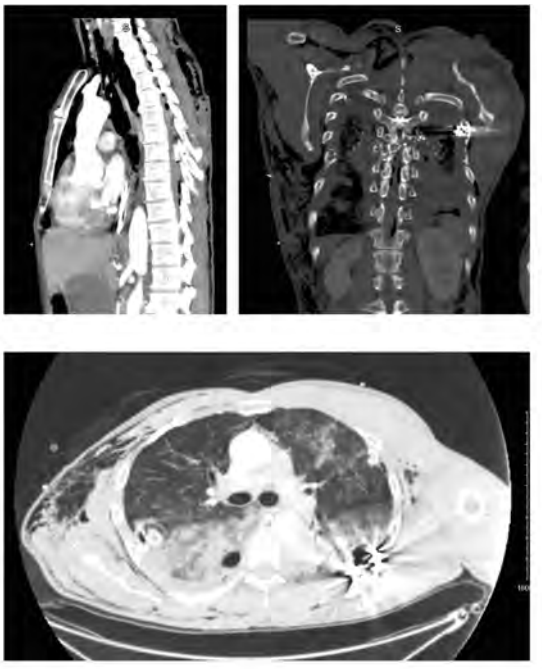
Image 2: Chest radiograph showing interval placement of endotracheal tube and bilateral chest tubes.



Images 3 & 4: CT Brain imaging showing sagittal view (left) and axial view (right) of pneumocephalus.



Images 5 & 6: CT Cervical Spine imaging showing sagittal view (left) and axial view (right) of cervical pneumorachis.



Images 7, 8, and 9: CT Chest Abdomen Pelvis imaging showing sagittal view (top left), coronal view (top right), and axial view (bottom) of intrathoracic injuries including pulmonary contusions, extensive subcutaneous emphysema, and diffuse pneumorachis.

No, authors do not have interests to disclose

EMF 361

A Nationwide Quality Assessment of Emergency Medical Services Management of Asthma and Chronic Obstructive Pulmonary Disease Exacerbations in the United States

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Study Objective: We aimed to evaluate the out-of-hospital management of asthma and chronic obstructive pulmonary disease (COPD) exacerbations by emergency medical services (EMS) in the U.S. using key quality measures.

Study Design/Methods: We conducted a cross-sectional evaluation of a nationwide sample of EMS patient care report data from the National EMS Information System from 2018-2019. We included 9-1-1 activations where a patient ≥2 years was treated and transported by EMS for an asthma/COPD exacerbation.

We developed potential quality measures for out-of-hospital asthma/COPD exacerbation management— including documentation of key vital signs and administration of recommended medications—based on review of EMS protocols, existing quality measures, practice guidelines, and relevant literature. We quantified the extent to which EMS care met these quality measures using descriptive statistics.

Results/Findings: A total of 1,336,988 EMS encounters for asthma/COPD exacerbations were included. Median age was 66 years, 55% of patients were female, and 83% of EMS encounters took place in an urban setting. Advanced life support (ALS) units managed 94% of asthma/COPD exacerbations. Respiratory rate (98%) and pulse oximetry (96%) were documented in nearly all cases. Supplemental oxygen was administered to hypoxic patients by 65% of basic life support (BLS) and 73% of ALS units. BLS administered inhaled beta-agonist therapy in 48% of cases, compared to 77% by ALS. ALS administered inhaled anticholinergic therapy in only 38% of cases and systemic corticosteroids in only 19% of cases. A lower proportion of pediatric patients received recommended medications compared to adults (Table).

Conclusion: We found gaps in the current state of EMS management for asthma/COPD exacerbations using key quality measures. In particular, we found low rates of inhaled-beta agonist therapy administered by BLS and low rates of systemic corticosteroid therapy administered by ALS. In addition, lower percentages of pediatric patients received inhaled beta agonist therapy and systemic corticosteroid therapy compared to adults. Our findings indicate important areas for research and quality improvement efforts to improve EMS management of asthma/COPD exacerbations.

Table: Selected quality measures for medication administration by EMS for asthma/COPD exacerbations, stratified by patient age in years.

Measure	Numerator	Denominator	Age <18	Age 18-55	Age 55+	All
Inhaled beta-agonist	Inhaled beta-agonist administered	All encounters	41,096 (70%)	207,506 (74%)	757,409 (76%)	1,006,011 (75%)
Inhaled anticholinergic	Inhaled anticholinergic administered	ALS	15,116 (26%)	102,537 (37%)	370,801 (37%)	477,886 (38%)
Systemic corticosteroids	Systemic corticosteroids administered	ALS + inhaled beta-agonist administered	4,179 (10%)	40,709 (20%)	140,043 (18%)	182,752 (19%)

Abbreviations: ALS, advanced life support; COPD, chronic obstructive pulmonary disease; EMS, emergency medical services.

No, authors do not have interests to disclose

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Transferring Children With Pediatric Skull Fractures Without Underlying Brain Injury: Is It Necessary?

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Background: Pediatric head trauma is a common cause of morbidity and often results in skull fractures. Pediatric skull fractures are distinct from adult fractures in that they have a greater capacity to undergo remodeling. The objective of this study was to evaluate whether children with isolated skull fractures requires surgical intervention. We reviewed characteristics, injuries, and outcomes.

Methods: A retrospective chart review was performed to review children under 3 years of age presented to the emergency department with isolated skull fracture due to head trauma between 2015 and 2021. We reviewed their demographics, mechanisms of injury, radiologic scans and findings, fracture location (displacement/non-displacement), ICU admissions, and treatments or interventions. Data were subdivided between those cases with skull fracture and those without. The t-test and chi-square were used for evaluating the differences.

Results: We reviewed medical records of 66 children with head trauma, including 26 children who had isolated skull fractures. The average age of the children with head trauma was 1.9±1.6 years and 59% were male, and most of the patients were brought in by mothers (71%). The mechanisms of injury were falls (64%), motor vehicle collisions (MVC) (11%), unknown (12%), and physical abuse (7%). The radiologic investigation included a head CT scan in 52 (79%) children, no testing was performed on 18% and one underwent head ultrasound and in two children skull x-rays were obtained. We noted 26 fractures (39%) in the age range of 3 months to 5 years (median age 6 months), significantly younger than those in the no fracture group. Brain CT scan was performed 96% of the time in these patients versus 67% in the no fracture group; clinical examination noted hematoma in scalp 31% of the time. The fractures were located in the parietal (46%), followed by occipital (19%) and temporal (15%) regions. Four fractures were depressed (15%) and the remainder were non-displaced. Eight children (31%) were transferred to a designated trauma center and the remaining 69% were hospitalized and monitored in the primary hospital. All of the hospitalized children had GCS of 15 on arrival; and none of the children with fractures required intubation or other advanced interventions.

Conclusion: In this relatively limited sample, isolated skull fractures mainly occurred due to falls and managed non- operatively. CT scans were obtained based on physician judgement since most children did not have scalp findings. Many children were transferred due to the protocol. Also, children with isolated skull fractures with otherwise normal neurological examination did not require surgical intervention. This further raises the question whether these children needed to be transferred to pediatric trauma centers or could be safely monitored in non-pediatric trauma centers. Thus, clinically stable patients could be observed successfully in a non-pediatric neurosurgical center provided there are no additional injuries.

Table 1: Overall and Subgroup Patient Characteristics

	Overall	Fracture	No Fracture	p-value
N/n	66	26 (39.4%)	40 (60.6%)	
Age, years	1.9±1.6	1.0±0.0	2.5±0.0	<.001
Median (IQR), years	1.45 (0.39-3.05)	0.52 (0.27-0.76)	2.53 (1.23-3.95)	
Gender				NS
Male	39 (59.1%)	12 (46.2%)	27 (67.5%)	
Female	27 (40.9%)	14 (53.8%)	13 (32.5%)	
Race				NS
African American	11 (16.7%)	3 (11.5%)	8 (20.0%)	
Hispanic	21 (31.8%)	12 (46.2%)	9 (22.5%)	
Other	34 (51.5%)	11 (42.3%)	23 (57.5%)	
Radiology Studies				0.028
CT	52 (78.8%)	25 (96.2%)	27 (67.5%)	
X-ray	2 (3.0%)	1 (3.8%)	1 (2.5%)	
Head Ultrasound	1 (1.5%)	0	1 (2.5%)	
None	12 (18.2%)	1 (3.8%)	11 (27.5%)	
Associated injuries				
Abdominal injury	1 (1.5%)	1 (3.8%)	0	
Hematoma (Scalp/Facial)	11 (16.7%)	8 (30.8%)	3 (7.5%)	0.0132
Hemorrhage (Subarachnoid/Subdural)	6 (9.1%)	6 (23.1%)	0	
Treatment				
Observation	55 (83.3%)	15 (57.7%)	40 (100.0%)	
Transferred	11 (16.7%)	11 (42.3%)	0	

Data presented as mean ± standard deviation for continuous variables and n percent for categorical variables. NS, not significant.

Table 2: Patients with Fracture

N	26
ICU	8 (30.8%)
Intubation	0
Fracture Location	
Frontal	2 (7.7%)
Parietal	12 (46.2%)
Temporal	4 (15.4%)
Occipital	5 (19.2%)
Parietal/Frontal	1 (3.8%)
Occipital/Parietal	2 (7.7%)
Fracture Description	
Depressed	4 (15.4%)
Non-Displaced	22 (84.6%)
OTHER RADIOLOGIC FINDINGS	
Right frontal parietal subarachnoid hemorrhage	1 (3.8%)
subdural hemorrhage	1 (3.8%)
Temporal hematoma	1 (3.8%)
Stable sub-galeal hematoma	1 (3.8%)
Data presented as n percent for categorical variables	

No, authors do not have interests to disclose

363 Developing a Survivor-Centered Emergency Department Approach to Tailored Resources of Survivors of Interpersonal Violence

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Study Objectives: Interpersonal violence (IPV) is a public health concern with a high lifetime prevalence (1in 4 women and 1 in 10 men). Survivors face significant barriers to seeking help or disclosing IPV in health care settings. The emergency department (ED) provides a key opportunity to offer survivors accessible information about rights and resources and link them to services tailored to their needs. This link is critical, especially as those presenting to the ED are at high risk for re-abuse and poor mental and physical health outcomes. Acting on ACEP's call for collaboration between EDs and outside IPV agencies, this work aims to solicit and incorporate feedback from IPV experts into the design of survivor-centered approaches to connecting patients at an urban safety-net academic-affiliated ED to local IPV services.

Methods: Using a design thinking methodology, we recruited a panel of experts to guide the initial needs assessment and iterative design process for both survivor and clinician-facing resources for outpatient referrals. Experts consulted included 2 ED social workers, 2 ED clinicians, an MD/JD subject matter expert, and a national champion for trauma informed IPV care. Their input illuminated key limitations in existing ED workflows. A semi-structured interview guide was developed and interviews conducted with 10 prominent local IPV organizations including crisis hotlines and shelters, legal aid, mental health, sexual assault, other advocacy services, and law enforcement, to further inform the design process.

Results: Barriers to IPV resource referrals identified included: clinician barriers with lack of time and skills to discuss IPV with patients, reliance on disclosure-based provision of resources rather than universal education models, patient fears about disclosure, variable readiness for help-seeking, the unknown safety or acceptability of patient handouts, and the value but difficulty of providing warm hand-offs directly from the ED. Social work and ED clinicians noted that existing ED referral decision tools and patient handouts did not address these unique barriers. They also noted the challenge of navigating the widely referenced LEAP SF list of 52 local IPV resources given patient's intersectional identities, multidisciplinary needs, and preferences about language, location, and police involvement. The interviews with IPV services offered guidance on how to best route referrals and create safe patient-facing materials. Their input and that of our physician IPV expert informed a survivor-centered, evidence-based approach to facilitate IPV resource referrals: (1) provision of resources to all patients through wide distribution of IPV education materials, (2) multilingual physical and digital patient materials highlighting survivor rights and selecting resources based on preferred language, and (3) a clinician facing resource with relevant local IPV resources and key information about their services, with a plan for mid-2022 launch and annual updates thereafter.

Conclusions: Despite growing research on optimizing ED IPV screening, there is limited guidance on the next step of effectively linking patients to resources. This work highlights key aspects of a survivor- centered approach: creating safer patient education materials accessible through multiple means and minimizing the number of hand-offs via more precise initial referrals, all of which is best built by communicating directly with local services.

Yes, authors have interests to disclose
Disclosure: FujiFilm-SonoSite
Consultant/Advisor
FujiFilm-SonoSite

364 A Dangerous Case of the "Goldilocks Effect": Experimental Demonstration of Potential Vascular Injury Mechanism with Central Venous Catheter Insertion

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Background: Point-of-care ultrasound has improved the safety of vascular catheterization but serious complications persist, including arterial injuries in 1.8% of internal jugular central venous catheter (CVC) insertions. While rare, arterial injuries can lead to severe morbidity and mortality. Following the identification of three serious vascular injuries related to the insertion of CVCs, one resulting in death, we hypothesized that arterial injury can occur despite appropriate ultrasound-guided intravenous placement of introducer needle and guidewire.

Study Objectives: We simulated CVC insertion to observe intravascular behaviors of device components and to test a hypothesized injury mechanism. Some large vascular catheters require the simultaneous insertion of a tissue dilator within a hollow catheter over a guidewire (Desilets-Hoffman sheath-introducer system), unlike triple-lumen catheters, which commonly use sequential insertion of a dilator and catheter using Seldinger technique. We hypothesized that if the guidewire is not inserted to sufficient depth (greater than the combined catheter/dilator length), the exposed tip of the dilator can puncture the vein posterior wall, injuring adjacent structures.

Methods: This was a simulation study performed at an academic medical center. We simulated large vascular catheter insertion (Arrowg+ard Blue® MAC, dual lumen, 9 French+12 gauge; 15.5 cm intracorporeal catheter/dilator length; 8.5 cm extracorporeal length). The kit includes a 45 cm guidewire, rather than the 60 cm guidewire supplied with triple-lumen catheters by the same manufacturer. An endoscope (Ambu® aScope) in the vessel lumen monitored needle insertion, guidewire position, and catheter/dilator position during insertion into an internal jugular catheterization mannequin (Blue Phantom™). A needle was placed into the vein and the guidewire was passed into the lumen. The catheter/dilator was placed over the wire and an incision made in the mannequin. The depth of guidewire insertion (defined as the length of wire inserted beneath the simulated skin surface) was then varied (Figure 1), and the effect on catheter/dilator behavior was observed.

Results: Figure 1 depicts safe and unsafe insertion conditions. With the guidewire inserted to a depth $\leq$ catheter/dilator length (15.5 cm), as the catheter was advanced, the dilator extended beyond the wire tip, with no leading wire to act as a guide. In this condition, the dilator tip pierced the posterior wall of the simulated vessel (Figure 2; Figure 1A).

Conclusions: We experimentally confirmed a new mechanism of vascular injury resulting from inadequate depth of insertion of the guidewire relative to the length of the catheter/dilator. The combination of short guidewire and long dilator contributes to risk by creating a narrow range of safe guidewire insertion depths ("Goldilocks Effect"). Published procedure guidelines and manufacturer instructions warn users of guidewire embolization risk if too deeply inserted, which may lead users to commit the observed error. The manufacturer instructions do not provide explicit guidance on appropriate guidewire insertion depth nor warn of vessel perforation. We found no references to this risk in peer-reviewed literature, major emergency medicine textbooks, or FDA databases. The mechanism can be extrapolated to other similar medical devices. We propose engineering solutions and procedural safety practices to reduce the risk of these injuries.

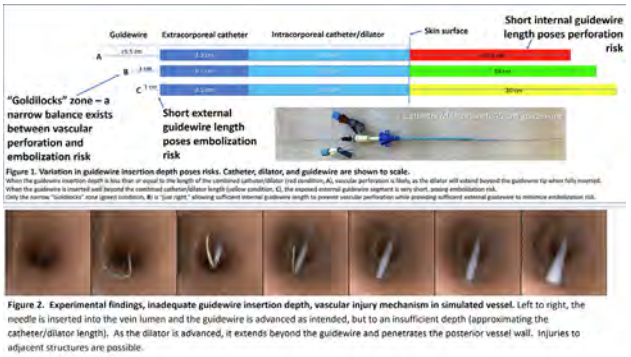

Figure 1. Variation in guidewire insertion depth poses risks. Catheter, dilator, and guidewire are shown to scale.

Figure 2. Experimental findings, inadequate guidewire insertion depth, vascular injury mechanism in simulated vessel. Left to right, the needle is inserted into the vein lumen and the guidewire is advanced as intended, but to an insufficient depth (approximating the catheter/dilator length). As the dilator is advanced, it extends beyond the guidewire and penetrates the posterior vessel wall. Injuries to adjacent structures are possible.

No, authors do not have interests to disclose

365 A Pilot Study of Hypothermia Prevention in a Hemorrhagic Swine Model

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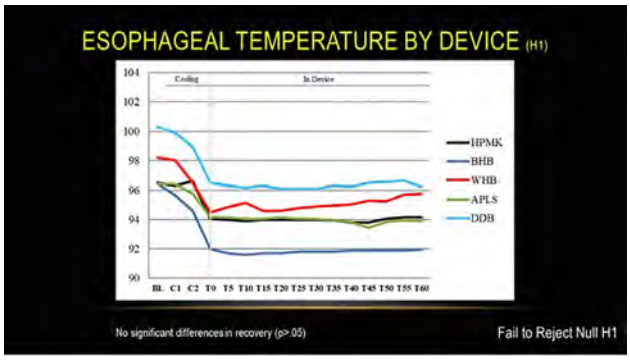
Study Objectives: Exsanguination remains the leading cause of preventable battlefield death, and post-traumatic hypothermia- induced coagulopathy increases mortality. Since 2010, Tactical Combat Casualty Care has only endorsed the Hypothermia Prevention and Management Kit (HPMK), based largely on a single study using non-live models. However, this original HPMK is no longer commercially available, empirical evidence suggests that the newer model is inferior to the original, and other manufacturers have produced competing devices. The primary objective of this study is to determine the hypothermia prevention device that is best at preventing hypothermia during hemorrhagic shock.

Methods: In this pilot study, we contrasted HPMK, Wiggy's Victims Casualty Hypothermia Bag (WHB), Blizzard Heat Blanket (BHB), APLS Mylar Bag (APLS), and the Doctor Down Rescue Wrap with Thermo- Pad (DDB) (2 each N=10 total) using a swine model of hemorrhagic shock with both external cooling and infused cold normal saline. Swine were assessed at baseline, after hemorrhage of ~30% estimated blood volume plus 30min cooling, then every five minutes for one hour after application of a randomly assigned device. Key outcomes were warming at esophageal and rectal sites (°F).

Results: Overall, hemorrhage plus cooling measures significantly cooled the swine (M=97.6±.06 to M=94.2±.07 esophageal, M=98.8±.06 to M=96.4±.08 rectal, each p<.0001). Temperature values across 60min in all warming devices had very small net changes (M=+0.2±.03 esophageal, M=-0.6±.03 rectal, each p>.05), with WHB marginally superior to other devices (M=+1.3±.03 esophageal, M=+0.1±.03 rectal).

Conclusion: Results of the present study provide empirical evidence that the tested devices were successful in mitigating post-traumatic hypothermia, but not evidence that these devices conferred clinically significant warming across one hour. This pilot study was limited by the modest sample size and the use of a swine model, but provides the foundation for a large formal study, with and without the infusion of warm blood, to test the efficacy of warming devices to prevent hypothermia-induced coagulopathy.



No, authors do not have interests to disclose

366 Cocaine Use Is Associated With Adverse Events in Emergency Department Procedural Sedation

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Study Objectives: In the emergency department (ED), patients commonly require procedural sedation (PS). This is performed in order to minimize the pain and anxiety associated with various diagnostic and therapeutic procedures. There is currently no large scale study which investigates how cocaine affects the incidence of adverse events (AE) in ED PS.

Methods: 2931 consecutive ED PS patients from 2017 – 2021 at 20 hospitals (tertiary care center and 19 affiliate hospitals across 2 states) were reviewed retrospectively. 2275 ED PS were performed on adults (≥ 18 years old), and 656 on pediatric patients (≤ 17 years old). AE were complications: respiratory rate < 8 breaths/min, apnea, systolic blood pressure > 200 mmHg, heart rate < 60 or > 100 beats/min, and SpO2 < 90% plus side effects: emesis, nausea, emergence reaction, paradoxical reaction, itching/rash, cough, myoclonus, hiccups. Adults were divided into cocaine use and non use groups. Cocaine use was defined as recent or current use based on documentation from the ED visit or a recent primary care visit. Data was entered into a Redcap database. Statistical analysis was performed with $P < 0.05$ statistically significant.

Results: 386 ED PS involved patients who were active drug users at the time of the sedation. Of these, 273 (70.7%) used marijuana, 40 (10.4%) cocaine, 31 (8.0%) heroin, 42 (10.9%) other drugs. Cocaine users had a mean (±SD) age of 44.2 (±13.3) years, BMI 27.4 (±6.5), and 40.0% were male. Non-cocaine users had a mean (±SD) age of 56.8 (±19.2), BMI 29.1 (±6.5) and 46.9% were male. Mean age, BMI and sex were all significantly ($p < 0.001$) different between cocaine and non-cocaine groups. Cocaine users were younger, had a lower BMI and less likely to be male than nondrug users. In the cocaine use group, 3 patients had a side effect (3/40 = 7.5%), 11 a complication (11/40 = 27.5%), and 0 had both (0/40 = 0%) for a total of 14 with an AE (14/40 = 35.0%). In the non-cocaine use group, 53 patients had a side effect (53/2236 = 2.4%), 324 a complication (324/2236 = 14.5%), and 26 had both (26/2236 = 1.2%) for a total of 403 with an AE (403/2236 = 18.0%). Comparing cocaine users to non-users, cocaine users had a significantly greater risk of complications (p=0.0311) and adverse events (p=0.0026), but not side effects (p=0.1837). The relative risk of a complication was 1.7569 (95% CI 1.0526 to 2.9324) and that of an AE was 1.9419 (95% CI 1.2614 to 2.9897).

Conclusion: Cocaine use places individuals at increased risk for complications and AEs during ED PS, despite users being younger and having lower BMIs than non-users on average. Obtaining a thorough cocaine use history may be beneficial for management involving ED PS and preparing for potential AEs.

No, authors do not have interests to disclose

367 Utilizing Existing Infrastructure to Rapidly Create a Cost-effective BioBank During the COVID-19 Pandemic in a Southern Community Hospital

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Study Objectives: In order to combat the COVID-19 pandemic and prepare for future pandemics, it is critical to be able to create biobanks of patient samples from

a wide variety of patients. The objective of this project is to highlight the utilization of existing infrastructure through a Department of Oncology to facilitate the rapid and cost-effective creation of a COVID-19 Biobank in our emergency departments (EDs) with description of sample demographics and overall cost. Oncology departments across the United States have established biobanks of patient samples and similar collaborations can serve as a model for other low-resource and community EDs.

Methods: Biorepository sample collection: All English-speaking patients who visited the PRISMA Health EDs at Greenville Memorial Hospital (Level 1 trauma center, 95K adult patients per year) and Greer Memorial Hospital (community ED, 54K adult patients per year) were eligible for enrollment. This project utilized an existing, IRB-approved, Department of Oncology Protocol and Consent for sample collection. 73 individuals with laboratory-confirmed COVID-19 infection were enrolled; these included pediatric and adult patients seen August 2021–March 2022. Demographic, biometric, laboratory, and outcome data were obtained from the Prisma Health Comprehensive COVID Registry (PHCCR). The PHCCR is a validated, HIPAA-compliant registry that contributes to the international Viral Infection and Respiratory Illness Universal Study (VIRUS) registry. This project was supported by an internal PRIMSA Health COVID-19 seed grant.

Results: Of the 73 individuals who participated in this study, 46 (63%) were admitted to the hospital while 27 (37%) were discharged from the ED. 25 (54.3%) of the admitted patients were female while 21(45.7%) were male. The average BMI of the admitted patients was 33.51 kg/m2 (SD=7.15) while the average BMI of discharged patients was 31.83 kg/m2 (SD=7.31). The average age of admitted patients was 58.65 years (SD=16.67) while the average age of discharged patients was 46.56 years (SD=19.51). 9 (12.3%) of the 73 participating individuals died; 7 (77.8%) of deceased individuals had been admitted on the ED visit at which they were recruited to join the Biobank, and 2 (22.2%) had been discharged. The cost to process the participant samples including long-term storage was $35.00.

Conclusions: This program highlights a rapid, cost-effective, and collaborative approach to developing a biobank of blood and plasma samples collected from ED patients with COVID-19. Utilizing existing infrastructure, we were able to use established, IRB-approved patient consent and collection protocols, limit overhead costs (personnel, storage, equipment etc), while simultaneously facilitating rapid enrollment. This approach also optimized compliance with important standard operating procedures. We enrolled 73 patients over 7 months, at an average cost of $35.00 per patient. Our total cost for biobank development and implementation was $2,555. This total cost is dramatically lower than the average $3-6 million cost for starting a biobank de novo. As a community hospital and young academic institution, the collaborative development of a biobank is a future-focused effort that will support the ongoing research into this pandemic. Our experience illustrates a model for further development of cost-effective, collaborative approaches to biobanking for the many other diseases seen in EDs globally.

No, authors do not have interests to disclose

368 Determining the Combined Impact of Geriatric-Specific Predictors of Hospitalization Among Geriatric Emergency Department Patients

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Study Objective: To address the persistently increasing volume and complexity of older emergency department (ED) patients > 65 years in the U.S., several geriatric-specific screening tools have been reported to predict hospitalization among these older patients. However, few EDs have the resources to implement multiple tools, but data on which tool performs best in comparison with one another is lacking. This study's objective was to determine the comparative performance of common published geriatric screening tools in a multi-ethnic ED patient population.

Methods: This is a prospective observational study using data collected for monitoring as part of Geriatric Emergency Department Accreditation from September 2019 to April 2022. The primary outcome was hospitalization during the index visit. Independent variables included age, means of arrival, chief complaint classification, prior ED visits within the past 30 days, prior inpatient hospitalizations within the past year, and the following ED screens: clinical frailty scale (CFS), Morse fall scale, a nurse medication screen which was positive if either the patient was on a 2015 Beers list medication or identified having difficulty with his or her medications at home, Katz Activities of Daily Living (ADLs), the Short Portable Mental Status Questionnaire (SPMSQ), the brief Confusion Assessment Method (bCAM), and the Identification of Seniors at Risk (ISAR) score. For patients with multiple visits, only the index ED visit was included. Multivariable models adjusting for demographic and clinical characteristics associated with hospitalization were constructed to compare the strength of association of each screening tool relative to others.

Results: In multivariable analysis of 1,183 unique ED patients, prior ED visit in the past 30 days (OR=0.6, $p<0.05$), and arrival by private vehicle or walk in were associated with a decreased odds of hospitalization on the index ED visit. Prior hospitalization in past 1 year (OR=1.5, $p<0.001$) and age (in years) were significantly associated with hospitalization OR for each year above 65 = 1.008, $p<0.01$. Among the screening tools, a CFS score >4 (OR 1.3; $p<0.05$), a Morse fall scale score >25 (OR 1.9; $p<0.051$), medication risk screen (OR 1.9; $p<0.01$) and a bCAM (OR 3.3; $p<0.05$) were independently associated with hospitalization. ISAR and ADLs were significantly associated with hospitalization in multivariable models without other geriatric ED screening included, but had no significant association with hospitalization when included in the final model: ISAR = OR 1.3; p=0.2 and the Activities of Daily Living = OR 1.3, p=0.2. SPMSQ was not significantly associated with hospitalization in any model (OR 1.18, p=0.1).

Conclusion: When multiple published geriatric screening tools for hospitalization among older ED patients were examined together, two readily available and easily implementable tools (CFS and bCAM) were strongly predictive, with the bCAM being the strongest predictor of hospitalization. These results suggest that of the geriatric ED screens used in this study, the CFS and bCAM have the most utility in predicting hospitalization during an index ED visit for older adults.

No, authors do not have interests to disclose

369 Echocardiographic Features and the Prediction Score Validation in Predicting Adverse Outcomes in Emergency Department Patients With Pericardial Tamponade

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Background: Echocardiography is the gold standard diagnostic modality for identifying pericardial tamponade, a disease of high mortality. In this study, we aimed to identify the specific echocardiographic features associated with adverse outcomes in patients with pericardial effusions requiring pericardiocentesis and, validate a previously described 4-point clinical and echocardiographic score (systolic BP <100mmHg, effusion size, right ventricular (RV) diastolic collapse, mitral valve (MV) inflow velocity variation >25%) in predicting worse outcomes.

Methods: We performed a retrospective cohort study using a patient sample from March 2015 to August 2020 at two large tertiary institutions. All patients who underwent transthoracic echocardiography (TTE) followed by pericardiocentesis within 48 hours, were included. Individual patient level clinical and TTE variables including effusion size, RV diastolic collapse, right atrial (RA) systolic collapse, inferior vena cava (IVC) plethora and exaggerated MV inflow velocity were retrieved for each patient. TTE variables and correlation with adverse outcome measures including hospital length of stay (h-LOS), intensive care unit (ICU) admission, 30-day and 1-year mortality were explored. This data set was then used to validate a previously proposed scoring system associated with worse outcomes. We constructed different step-wise logistic regression models including variables of demographics, prior medical conditions, anticoagulation use, vital signs and TTE variables. We also examined effects of these echocardiographic findings on ICU admission and h-LOS using logistic regression. The model performance of logistic regression was evaluated using AUC-ROC (Area under curve, C-statistic) and sensitivity/specificity in discriminating the outcome.

Results: 261 patients (mean age 60 years, 52.1% female) were included in the final analysis. Presence of positive TTE variables were as follows: 62.0% RV diastolic

collapse, 47.5% RA systolic collapse, 50.5% IVC plethora and 55.9% exaggerated MV inflow velocities. No TTE variables had a statistically significant association with h-LOS, 30-day, or 1-year mortality. Variation in MV inflow velocity was associated with ICU admission (p=0.031). In addition, history of prior pericardiocentesis and malignancy was associated with increased h-LOS (p= 0.0105 and p=0.002 respectively), and systolic blood pressure (<90 mmHg) was associated with ICU admission (p=0.024). In validating the score reported in the previously published prediction score, we found no statistically significant correlation in predicting 30-day or 1-year mortality.

Conclusions: RV diastolic collapse and exaggerated MV inflow velocity were the most common echocardiographic findings in patients requiring pericardiocentesis. Variation in MV in-flow velocity is associated with increased ICU admission. However, no TTE variables were associated with mortality or h-LOS. In this cohort, the prediction score was not associated with worse outcomes.

No, authors do not have interests to disclose

370 Correlation Between the Electronic Frailty Index and Hospitalization Mortality in Older Adults Infected with SARS-CoV-2

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Study Objectives: Early in the SARS-CoV-2 pandemic, it became evident that older adults were at the greatest risk for severe disease and mortality. Frailty, defined as progressive age-related decline in physiology and function is more indicative of health outcomes than chronologic age alone. The Electronic Frailty Index (eFI) is an electronic health record (EHR) based calculation which indicates a patient's degree of frailty. Scores are generated from a combination of 56 parameters including diagnosis codes, lab values, social history elements, functional assessments, and markers for polypharmacy. In prior studies, the eFI has been shown to be an independent indicator of increased falls, more frequent hospitalization, and all-cause mortality in older adults. The goal of this study is to determine if eFI is an independent predictor of worse outcomes in patients with SARS-CoV-2 infection.

Methods: This is a retrospective cohort study of patients over age 55 who were admitted to Wake Forest Baptist Medical Center and tested positive for SARS-CoV-2 infection from March 1, 2020 through August 31, 2020. The value for the eFI is generated within the EMR once at least 30 or more of the 56 underlying parameters are available for calculation including 9 of 20 laboratory values. By default, our eFI implementation only calculates scores for patients age 55 and older. Based on eFI score a patient may be considered fit (<0.1), pre-frail (0.1-0.2), frail (>0.21), or very frail (>0.3). Differences in mortality were compared using Chi Square, Kruskal-Wallis, and Logistic Regression as appropriate.

Results: During the study period, 570 patients were admitted with SARS-CoV-2. Of those, 362 were age 55 and older. Of 362 patients, 208 had data to complete calculation of electronic frailty index. Median age was 69.2 years with IQR of 16.1. Median BMI was 28.7 IQR 8.6. Race and ethnicity: 52.8% White; 33.65% Black, 8.2% Hispanic; 2.8% Asian; and 2.4% Native American. Our overall 30-day death rate was 18.3%, 15.4% in-hospital deaths, and an additional 2.9% over 30 days. Patients with severe frailty had a higher death rate than lesser frailty groups (40% versus 17.7%) but this was not statistically significant in univariate (chi Square) analysis. However, no patients in our study group with severe frailty were admitted initially to the ICU. Factors with univariate association with death included initial admission to ICU 31.1%, (p=0.012, OR 2.6, 95% CI 1.2-5.6) origination from a nursing home 33.6%, (p = 0.010, OR 2.8 95% CI 1.2-6.3) and advancing age (p <0.0001). Factors with independent association with increased mortality, after controlling for other variables using logistic regression included: age OR 1.07 (95% CI 1.03-1.12), initial admission to ICU OR 3.33 (95% CI 1.35-8.20) infiltrate on chest radiograph 4.20 (95% CI 1.26-13.98), history of diabetes 3.16 (95% CI 1.32-7.60), and active cancer 3.02 (95% CI 1.02-8.95).

Conclusion: While frailty index may have an isolated association with increased mortality in the setting of SARS-CoV-2 infection, in this patient cohort, only age, infiltrate on chest radiograph, and history of diabetes or active cancer had a statistically significant impact.

No, authors do not have interests to disclose

371 Implementation of a Geriatric Care Coordinator (GCC) Program for High-Risk Geriatric Patients Following Emergency Department Discharge

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Study Objectives: Older adults who are discharged from the emergency department (ED) are at risk for adverse health outcomes, especially if they have difficulty navigating health systems to obtain recommended follow-up. Our department initiated a telephone-based geriatric care coordinator (GCC) program to assess patients' needs after discharge and help obtain outpatient appointments and other services. Our research objective was to characterize the types of resources that the GCC was able to facilitate.

Study Design/Methods: This was a retrospective observational study of GCC program implementation at the Cedars-Sinai Medical Center ED, which is a quaternary urban academic medical center ED with 90,000 annual visits, 33% of which are for adults age 65+. We reviewed three months of data from February 1 to April 30, 2022. Patients age 65+ were referred to the GCC through one of two pathways: 1) ED physician referral through an order in the electronic health record or 2) automatic referral for patients with one of the following high-risk criteria: chief complaint or discharge diagnosis of syncope, fall, delirium, altered mental status, or fracture; positive brief Confusion Assessment Method (bCAM) screening; or medium-to-high score on the Morse Fall Risk Scale. A single non-clinician GCC staff member with training in case management conducted all GCC activities by telephone while off-site, generally leaving up to two voice messages for patients before considering them lost to follow-up.

Results/Findings: During the 3-month study period, a total of 702 unique patients were referred to the GCC: 253 patients were referred by ED physicians, and an additional 449 were auto-referred. The GCC successfully reached 60.8% (426/702) of patients. Reasons for unsuccessful contact included: unreturned voicemails (157/276), patient hospitalized/institutionalized (93/276), and invalid phone number (20/276). Among the 426 patients who were reached, there were 507 total requests for connections to appointments or services. 128 unique patients (128/702 = 18.2%) received 171 connections to medical and social services with assistance from the GCC. See Table 1 for additional detail about the connections requested, completed, declined by patients, and unable to be made.

Conclusion: Implementation of a GCC program led to contact with 60.8% of referred patients and successful facilitation of follow-up appointments and services for 18.2% of referred patients in just 3 months. Auto-referral contributed to nearly twice as many referrals compared to the number of referrals requested by physicians. This novel program is a promising step toward improving care transitions for vulnerable geriatric patients discharged from the ED. Future work should be done to measure the impact on patient experience and health outcomes and to determine the program's cost effectiveness.

Table 1: Geriatric Care Coordinator Program requests for care connection

Types of Connection Requests	Number of Connections Requested	Number of Connections Completed by GCC	Number of Connections Declined by Patients	Unable to Connect with Service
Primary Care Physician Follow-up	216	62	99	55
Specialist Physician Follow-Up	172	53	59	60
Home Health Referral	55	18	17	20
Transportation Assistance	8	5	1	2
Food Resources	2	2	0	0
Access to Medication Assistance	5	4	1	0
Caregiver Assistance	24	16	4	4
Financial Resources	16	9	0	7
Balance / Fall Risk Assessment	9	2	1	6
TOTALS	**507**	**171**	**182**	**154**

No, authors do not have interests to disclose

372 Perceptions, Use, and Behaviors Surrounding the Receipt of a Naloxone Kit for Patients with Opioid Use Disorder in an Urban Emergency Department

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Study Objectives: Nationwide, emergency departments (ED) are evolving to include take home naloxone kit programs in response to the opioid epidemic. The impact of these programs has not been thoroughly studied. Our study objective was to gain insight into perceptions and behaviors associated with the utilization of these kits among people with opioid use disorders in an urban ED.

Methods: This was a single center, IRB-approved, prospective survey. Participants were included if they were over 18 years old and received a naloxone kit and accompanying training after coming to University Hospital in Newark, NJ from April 2020 to August 2021 for opioid overdose. They were surveyed anonymously via phone and asked questions addressing how naloxone kits impacted their opioid use habits and overdoses in the community. The survey used Multiple Choice and Likert Scale Questions from 1-5, where 5 meant Very Much. Yes or No answers were marked 1 or 0, respectively. Survey answers were logged in an online database and analyzed with Excel. We aimed to determine whether patients receiving naloxone kits use them, what the kit impact is on risk of opioid overdose, what the attitudes are towards naloxone, and to understand behaviors associated with naloxone kit possession.

Results: We called 299 people and surveyed 48. 28 participants (72%, CI: [44, 71]) have been using opioids for over 10 years, 43 (90%, CI: [78, 95]) were administered naloxone between 0 and 5 times, and 39 (81%, CI: [68, 90]) had gone to the ED 0 to 5 times for opioid overdose related complications. Positive emotional reactions to receiving kits were reported by 33 (69%, CI: [55, 80]), and 1 (2%, CI: [0,12]) had a negative one. Opioid use in solo vs group setting was preferred by 32 participants (67%, CI: [53,78]). No further overdoses were reported by 45 (94%, CI: [83, 98]). Of the 3 (6%, CI: [2, 17]) cases of overdose, 1 (2%, CI: [0, 12]) had the kit present but not used, and 2 (4%, CI: [1, 14]) had other people present. Less opioid use after receiving the kit was noted by 32 (67%, CI: [53, 78]) when compared with prior kit reception, and 7 (15%, CI: [7, 27]) using the same amount. 28 (58%, CI: [44, 71]) were present at least once when someone else overdosed on opioids. Of these, 26 (54%, CI: [40, 67]) called or had someone else call 911, 15 (31%, CI: [20, 45]) gave or made sure someone gave naloxone, and 24 (50%, CI: [36, 64]) stayed or made sure someone else stayed until help arrived. Of the 48 participants, 45 (98%, CI: [83, 98], mean: 4.96) rated the importance of responding to an opioid overdose as 5, 47 (94%, CI: [89, 100], mean: 4.90) rated the importance of recognizing an overdose as 5, 25 (52%, CI: [38, 66], mean: 3.96) rated their ability to use a kit as 5, 32 (67%, CI: [53, 78], mean: 4.60) rated the perception of the reduction in death from naloxone as 5, and 31 (65%, CI: [50, 77], mean: 4.40) believe their risk of dying from an opioid overdose as 5. The kits were still held by 35 people (73%, CI: [59, 83]). While at the hospital, 29 (60%, CI: [46, 73]) were connected to medications for opioid use disorders and 4 (8%, CI: [3, 20]) wanted to be connected at the time of survey.

Conclusion: The implementation of take-home naloxone kits may reduce risk of overdose, opioid use behavior, and witnessed overdose. The possession of these kits had a favorable response among participants, and interventions should be put in place to make take-home naloxone standard practices in EDs.

No, authors do not have interests to disclose

EMF

374 The Ideal Transcutaneous Pacer Pad Position Study

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Background: Transcutaneous cardiac pacing is a lifesaving procedure for patients with certain types of unstable bradycardia. The American Heart Association (AHA) guidelines for the management of unstable bradycardia recommend initiating transcutaneous pacing in patients unresponsive to atropine while addressing the primary cause of the bradycardia. Current major resuscitation guidelines do not address which pacer pad position to use. The aim of this study was to assess the difference in the pacing thresholds between the anteroposterior (AP) and anterolateral (AL) pacer pad positions.

Methods: This was a prospective crossover trial and patients who presented to the electrophysiology lab for an elective cardioversion were enrolled. After successful cardioversion, participants were sequentially paced in both the AP and AL positions. The study procedure concluded after successful capture or inability to achieve capture by 140 mA (the pacer's maximum output) in both positions. Pacing thresholds were compared between positions using a student's paired t-test.

Results: Forty-one patients were screened and 20 were enrolled in the study. Seven participants were excluded from the paired analysis due to the lack of capture in both positions or early pacing termination at the anesthesiologist's discretion. The study population consisted of 14 men and 6 women with a median age of 65 years. The AP position was associated with a pacing threshold that was, on average, 33 mA lower than the AL position (p-value = 0.001, 95% CI 20–45).

Conclusion: Pacing in the AP position requires, on average, 33 mA less energy than the AL position and was more successful overall. Major resuscitation guidelines should favor the AP position for transcutaneous cardiac pacing.

No, authors do not have interests to disclose

376 Point-of-Care Ultrasound-First for the Evaluation of Urolithiasis in Patients Who Fit Choosing Wisely Criteria: National Cost Savings and Length of Stay Reduction

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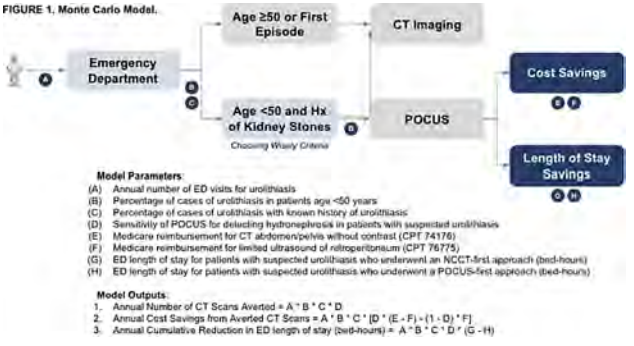
Study Objectives: Choosing Wisely guidelines recommend against ordering non-contrast computed tomography (NCCT) for patients with suspected urolithiasis who are under the age of 50 and have a history of recurrent kidney stones. Our primary objective was to estimate the annual national cost savings and reduction in emergency department (ED) length of stay (LOS) from using a point-of-care ultrasound (POCUS)-first approach for patients with urolithiasis meeting Choosing Wisely criteria.

Methods: We created and ran 1,000 trials of a Monte Carlo simulation. The study population included all patients who presented to the ED and were diagnosed with urolithiasis. Using this simulation, we modeled national cost savings in averted advanced imaging from a POCUS-first approach for urolithiasis. The model assumes that patients with indeterminate or negative POCUS studies underwent NCCT for further evaluation. We applied the same Monte Carlo model to estimate the reduction in ED LOS.

Results: Using this model, a POCUS-first approach in our select patient population for diagnosing urolithiasis was estimated to save a mean (±SD) of $25.5 million (±$2.7 million) by avoiding 203,000 (±21,000) NCCT scans. This resulted in a national cumulative decrease of 205,000 (±874,000) ED bed-hours.

Conclusions: If adopted widely, a POCUS-first approach for suspected urolithiasis in patients who meet Choosing Wisely criteria could yield significant cost savings and reduction in ED LOS. Further research is needed to explore drivers of the lack of widespread adoption of this clinical workflow.



No, authors do not have interests to disclose

377 Peer-Instructed Teleguidance Ultrasound in Undergraduate Medical Education: A Randomized Control Equivalence Study

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Study Objectives: The use of peer-instructed ultrasound teleguidance has the potential to provide high-quality, cost-effective clinical education to medical students. The COVID-19 pandemic has shifted focus to alternatives to in-person learning, and demonstrated the success of many such programs. Furthermore, there is increased demand for novel teaching modalities that are adaptable and broad in application, such as teaching techniques such as pulmonary ultrasound that have grown in popularity in the past decade and most recently in the pandemic. However, there is a limited amount of data evaluating the effectiveness of such methods in practice. Our primary aim is to evaluate how peer- taught teleguidance teaching compares to traditional in-person teaching of ultrasound in undergraduate medical students. Our secondary aim is to evaluate its application specifically in teaching pulmonary ultrasound during the COVID-19 pandemic.

Methods: In a single center study, 47 first year undergraduate medical students were recruited and randomized into either a traditional in-person teaching group or a peer-instructed ultrasound teleguidance group using the Butterfly iQ+ portable ultrasound probe. Sample size analysis was performed using ClinCalc, and the minimum sample size required to power the study with 90% power and 0.05 alpha was 42 students. Proficiency was assessed by change in knowledge score on pre and post-test, and objective structured clinical exam (OSCE). Change in confidence, overall experience, and experience with a peer instructor measured using a 5-point Likert scale. Two one-sided t-test (TOST) used to measure equivalency between the two groups ($p < 0.05$). Furthermore, this methodology was repeated with a new cohort using a novel subject topic of pulmonary ultrasound in the setting of growing clinical application during the COVID-19 pandemic.

Results: The teleguidance group performed as well as the traditional in-person group in terms of knowledge change, confidence change, OSCE time and OSCE scores ($p = 0.010$, $p = 0.005$, $p = 0.005$, $p = 0.0015$, respectively). The teleguidance group rated the experience highly overall (4.06/5), but less than the traditional group ($p = 0.448$). Peer-instruction was overall rated 4.35/5. Additional results from a follow-up study involving retention and cross-topic application in pulmonary ultrasound relevant to clinical COVID-19 education are pending and will be added upon acceptance.

Conclusion: Peer-instructed teleguidance is an effective method of teaching ultrasound to undergraduate medical students. With the increasing need for virtual education and growing evidence in teleguidance peer-education, this holds promising pilot data for future developments in its use in undergraduate medical education.

No, authors do not have interests to disclose

378 A Higher D-Dimer Threshold Can be Used to Predict Pulmonary Embolism in COVID-19 Patients Presenting to the Emergency Department

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Study Objective: While our understanding of COVID-19 has evolved, uncertainty remains regarding the utility of previously established pulmonary embolism (PE) screening guidelines in COVID-19 positive patients. Many studies have investigated the efficacy of D-dimer (DD) screenings for admitted COVID-19 patients, but few have looked specifically at patients in the emergency department (ED). While a DD value greater than 500 ng/mL can be used to guide further PE workup in non-COVID patients, a higher threshold should be considered in COVID-19 patients who often have an elevated DD at baseline. The purpose of this study was to investigate a higher DD threshold for PE screening and identify factors that predict risk for PE in COVID-19 patients presenting to the ED.

Methods: This was a retrospective cohort including patients who presented to our ED between March 1, 2020 and February 1, 2021 and who tested positive for COVID-19 during ED visit or just prior to presentation and had a DD ordered in the ED during their diagnostic workup. Exclusion criteria were as follows: direct admissions, transferred from another hospital, <18 years old, or pregnant. Patients were grouped by those who underwent computed tomography pulmonary angiogram (CTPA) to evaluate for PE and those who did not and descriptive statistics were performed. Those who underwent CTPA were further divided into PE-positive and PE-negative groups. Single logistic regression models were fitted to examine the relationships between PE diagnosis and various individual predictors. We calculated sensitivity and specificity for predicting PE at various DD thresholds. The optimal DD cutoff to predict PE in this patient population was obtained from a receiver operating characteristic (ROC) curve using Youden's J statistic. Analyses were performed using the R statistical programming language, version 4.1.3.

Results: A total of 570 COVID-19 positive patients who had DD performed while in the ED were included in the study, of which 107 underwent CTPA to evaluate for PE. PE was diagnosed in 14 (13.1%) patients. Patients with PE were significantly more likely to have a history of diabetes and have initial labs with elevated glucose and lactate. They were also significantly more likely to be admitted to the ICU (64% of PE + patients vs 26% of PE - patients). Those with PE had a significantly higher mean DD value (29007 ng/mL) compared to the PE-negative group (3062 ng/mL). The optimal DD threshold for predicting PE was 1815 ng/mL (AUC was 0.91, [95% CI (0.84, 0.98)], sensitivity 93%, specificity 80%). Using this threshold would have resulted in 32 total CT scans with one missed PE and 19 false positives. A conservative threshold of 1089 ng/mL could be used with sensitivity 100% and specificity 58%. Using this threshold would have resulted in 53 total CT scans with no missed PEs and 39 false positives. Thus in our study of 107 patients, 54 CT scans could have been avoided with no compromise in diagnosis.

Conclusion: History of diabetes, elevated glucose, and elevated lactate were significantly associated with increased risk for PE in our patient population. Increasing the DD threshold could safely predict risk of PE in COVID-19 patients presenting to the ED while reducing unnecessary CTPAs.

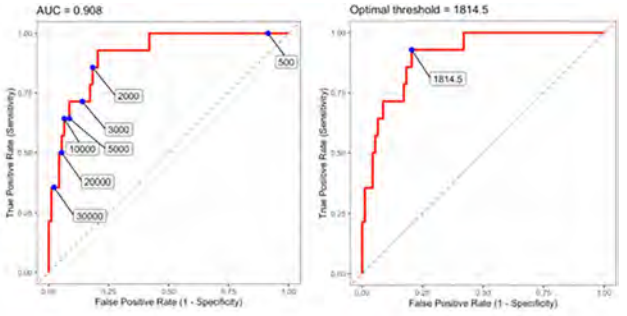

Figure 2. Receiver operating characteristic curve

No, authors do not have interests to disclose

379 Rural Emergency Medicine: The State of Rural Rotations in Residency Training Programs

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Study Objectives: As rural hospitals find it difficult to staff their emergency departments with residency trained emergency physicians (EPs), we theorize residents exposed to emergency medicine practiced in rural settings during training are more likely to seek careers in these communities. However, the current availability of rural rotations among EM residencies is unknown. This investigation aimed to describe the prevalence of rural experiences offered across EM training programs and characterize both benefits and challenges of providing these experiences. The study grew out of work done by the 2020 ACEP Rural Emergency Care Task Force and is the first step of a multi-phase project looking at factors that influence early career EPs' decisions to practice in rural settings.

Study Design/Methods: This was a mixed-methods study using a national survey of residency programs in 2020, sent through the Council of Residency Directors in Emergency Medicine (CORD) listserv, to determine the prevalence and characteristics of rural rotations offered. Survey respondents who volunteered to engage in further discussion participated in qualitative structured interviews to explore the attitudes of

program leaders regarding the educational utility of, and barriers to, rural rotations. Survey data were analyzed using descriptive statistics. Interviews were evaluated using an analytic coding scheme to identify the context around barriers to, and benefits of, rural rotations as defined in the survey.

Results/Findings: 86 surveys were completed, representing 75 residencies across 34 states and the District of Columbia (75 of 247 EM residencies, 30.4% of all EM residencies). Among respondents, 31 (41.3%) programs offer a rural experience while 17 (22.7%) require at least one rural rotation. 81 (94.2%) individual respondents felt there were benefits to offering a rural rotation. Commonly identified advantages of rural rotations included experience in environments with single coverage and limited consultant availability. The most frequently cited barriers to offering residents rural exposure were costs for housing and other amenities related to distant rotations (27%), lack of supervision by board certified EPs (20%), and costs of resident salaries (19%). Structured interview themes were consistent with survey results, elucidating how and why these issues impact availability of rural rotations, and highlighting improved competence and independence of residents after participation in rural blocks.

Conclusion: Residency program leaders report rural rotations offer compelling benefits to trainees, yet this study suggests availability of rural rotations remains limited for many EM residents. As the specialty looks toward the future of its workforce and the importance of equitable access to EPs across all communities, it is imperative to consider how residency training experiences shape the career decisions of new EM graduates and ensure training opportunities address workforce needs. Additional research is needed to determine the influence of rural rotations on residency graduates' short- and long-term choices around practice environment, as well as strategies to overcome existing barriers.

No, authors do not have interests to disclose

380 Engaging Community Stakeholders in Curricular Development: A Patient-Centered Approach to Teaching Harm Reduction to Medical Students

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Background: The impact of opioid use disorder (OUD) in the United States continues to rise, yet this topic has limited coverage in most medical school curricula.

Study Objectives: The study partnered with academic and community harm reductionists to design a curricular case of opioid withdrawal to teach fourth-year medical students about harm reduction and substance use disorder during their emergency medicine clerkship.

Methods: Academic and community harm reductionists iteratively designed a curricular case in partnership with the educational team. Community-engaged pedagogy informed this process to promote social action and power- sharing through education. The authors drafted a case in which a 34-year-old man with OUD presents to the emergency department with nausea and vomiting. Students are subsequently prompted to diagnose opioid withdrawal, treat with buprenorphine, offer HIV and hepatitis C testing, and provide safer use materials. Feedback on the case was solicited from clinical providers including an addiction medicine physician, a National Institute on Drug Abuse-funded physician, a fourth-year medical student, and a compensated community focus group of five individuals with lived experience of substance use.

Results: Clinical providers suggested using more approachable language (eg, "buprenorphine start" rather than "induction") and incorporating additional resources (eg, handouts on buprenorphine self-starts and fentanyl test strips). Community members identified opportunities to practice trauma-informed care. The case was subsequently revised to prompt medical students to identify and address the use of stigmatizing language, empowering students to act as change agents in a clinical environment. The updated case additionally prompts students to ask the patient where the team should look for intravenous access and discuss using an ultrasound if needed. Finally, the case was adjusted to encourage students to both assess objective withdrawal scores and to inquire if the patient feels he is ready to start buprenorphine.

Conclusions: This process supports the feasibility and importance of incorporating the voices of people with lived experiences into medical school curricular development and created an informed curricular innovation for medical students to learn more about OUD and harm reduction. The educational intervention was seamlessly integrated into the existing curriculum and could easily be expanded to other sites.

No, authors do not have interests to disclose

381 Intra-Nasal Fentanyl for Fracture Patients in the Pediatric Emergency Department

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Study Objectives: Long bone fractures are a common and painful complaint among pediatric emergency department (PED) patients. Communication barriers and intravenous (IV) line insertion delays are known to contribute to under treatment and delays in pediatric pain control. We aimed to improve analgesia and decrease the time pediatric fracture patients wait to receive their first dose of analgesic medication after arrival to the PED.

Methods: We created a nurse-driven protocol for patients with suspected long bone fracture to either administer ibuprofen for mild pain or obtain a physician order for intra-nasal (IN) fentanyl for moderate to severe pain. We developed a pre-completed and prominently displayed weight based IN fentanyl order in our electronic medical record for ease of ordering. We retrospectively compared pre- and post-intervention data describing the time from arrival to the PED until administration of the first analgesic medication for patients with a long bone fracture. Patients were identified by PED visit International Statistical Classification of Diseases and Related Health Problems (ICD) codes. Pre-intervention data included patients cared for during 2019, which was the year prior to development of the protocol. Post-intervention data included patients cared for from 06/21/2021 through 01/31/2022. We excluded patients arriving by emergency medical services, expecting that many received analgesics en route. We excluded patients who did not receive analgesics within 8 hours of arrival to the PED, as chart review confirmed that most were private-vehicle transfers from outside hospitals who arrived with splints in place and were likely to have received analgesia prior to transfer. For statistical comparisons we used medians and Wilcoxon rank-sum tests to compare time-to-administration between groups and chi-square tests to compare proportions.

Results: There were 321 pre-intervention and 255 post-intervention included patients. The median time to analgesia administration decreased from 51 minutes to 40 minutes ($p=.0029$). The proportion of patients who received analgesia in goal time of <45 minutes after arrival increased from 44% to 54% ($p=.0122$). IN fentanyl was given to 7% of fracture patients in the pre-intervention group and increased to 37% of patients in the post-intervention group. IN fentanyl patients waited a median time of 26 minutes post-arrival for their medication, and 74% received the medication within 45 minutes of arrival. Patients who received IV medication waited significantly longer, a median of 81 minutes for IV morphine and 52 minutes for IV fentanyl.

Conclusions: PED patients with long bone fractures obtained analgesic medication significantly faster after implementation of a protocol encouraging use of ibuprofen or IN fentanyl, and the proportion of patients receiving analgesia within goal time of <45 minutes improved significantly. Overall use of intranasal fentanyl use for fracture patients increased markedly. When IN fentanyl was the first analgesic ordered, it was given much faster compared to other analgesics.

No, authors do not have interests to disclose

382 A Survey of Exposure to Community Violence and Adverse Childhood Experiences in Emergency Department Patients

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Background: Exposure to community violence (ECV) is a public health issue linked to negative mental and physical health outcomes. Adverse childhood experiences (ACEs) impose a long-term relationship with risk factors for chronic illness, high-risk behaviors, and early death (Felitti 1998). The emergency department (ED) plays a critical role in the care of patients exposed to community violence and ACEs. Unfortunately, patients' experiences often go unidentified, leading to missed opportunities to address and prevent further harm.

Study Objective: We administered a survey of trauma exposure in ED patients to 1) identify the prevalence of ECV and ACEs in an urban setting, 2) identify an association between geographic residence and ECV and ACEs, and 3) determine perceived social service needs for patients who endorse ACEs.

Methods: This prospective, self-administered survey study was conducted on a convenience sample at one academic hospital in Chicago, IL, between July 2018 and December 2019. Participants were enrolled if they were patients in the ED, 18 years and older, could read English, and consented to the study. Participants were excluded if they declined, were critically ill, could not read English, or were under 18 years old. Researchers consented participants and provided the surveys. Researchers collected

participants' medical record numbers to obtain their zip codes and chief complaint for that visit from the electronic medical record.

The 22-question survey included demographic information and questions modified from the validated Adverse Childhood Experiences Study questionnaire, the 54-item Survey of Exposure to Community Violence, and the Primary Care PTSD screen (Felitti 1998, Dong 2004, Richters 1990, Prins 2003).

Participants are also asked to identify resources to address their traumas. Investigators transferred survey responses to a password-protected site for data extraction.

Results: 267 of 268 surveys administered were completed. 50.5% of study participants identified as Black, 19.8% as Hispanic, 22.8% as non-Hispanic White, 2.6% as Asian, and 3.3% as Other. 61.8% of respondents identified as female, 36% as male, and 1 as Other. 88% of participants endorsed exposure to at least one ACEs or ECV.

53.6% of respondents endorsed exposure to at least 1 ACE, and 15.7% of total respondents were exposed to 4 or more ACEs. The most commonly endorsed categories of ACEs were "Emotional Neglect" (30.3%), "Psychological trauma" (25.8%), and "exposure to family substance use" (21%). 79.8% endorsed hearing gunshots in their communities. 66% said they had seen someone shoved, kicked, or punched, 21.3% had seen someone stabbed, and 28.1% had seen someone shot. 26.2% of ED patients said they saw a violent death either in their home or neighborhood. Finally, 47.9% said they had been shoved, kicked, or punched.

Of the respondents (n=235) with at least one ACE or ECV, 38% asked for resources through their primary care clinic. 77.4% of respondents asked for resources through faith-based organizations. These findings suggest that most respondents in the ED had experienced ACEs and ECV but favored outside resources.

Conclusion: These results demonstrate the need for screening and intervention to address the impact childhood trauma and community violence have on patients' lives. It speaks to the importance of instituting trauma-informed care in the ED. However, more research is needed concerning implementing interventions and the impact of trauma-informed care in the ED.

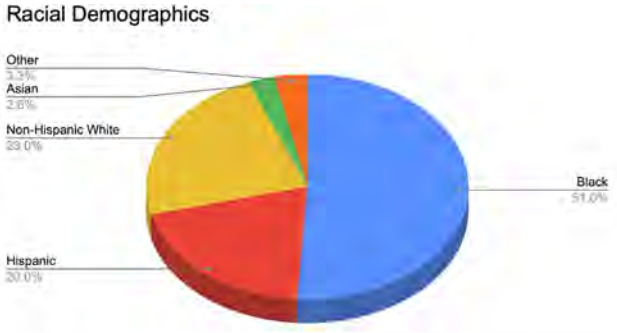

Figure *x*: 135 respondents (n=267) self-identified as Black, 53 (19.8%) as Hispanic, 61 (22.8%) identified as Non-Hispanic White, 7 (2.6%) identified as Asian and 9 (3.3%) identified as Other.

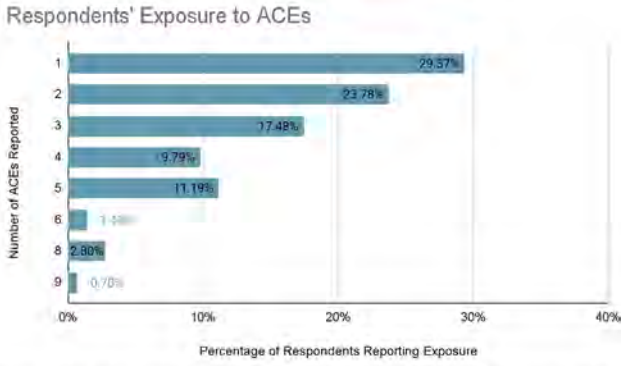

Figure *x*: 53.6 % of all respondents (n=267) reported exposure to at least 1 adverse childhood experience (ACE). Most commonly endorsed ACEs included "emotional neglect (30.3%), "psychological trauma," (25.8%), and "exposure to family substance use," (21%).

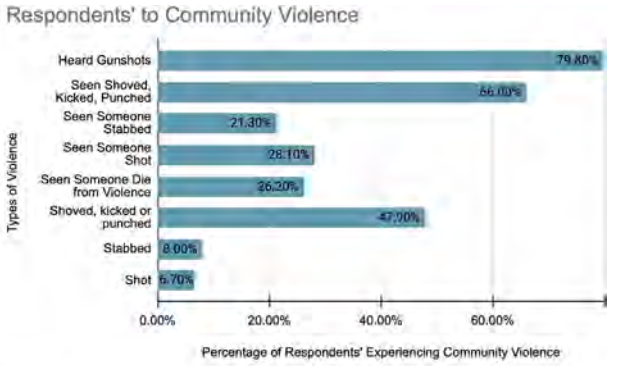

Figure x: 213 (79.8%) of all respondents (n=267) endorsed hearing gunshots in their communities, 66% (176) said they had seen someone shoved, kicked or punched, 21.3% (57) had seen someone stabbed, 28.1% (75) had seen someone shot. 26.2% (70) said they had seen someone die from violence either in their home or in their neighborhood.

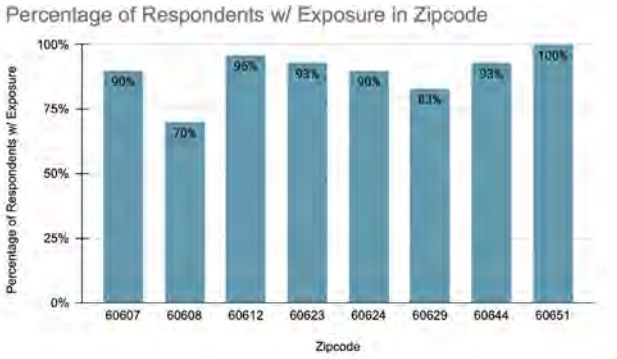

Figure x: Shows the most frequent zip codes where participants lived according to their medical records and endorsed exposure to violence.

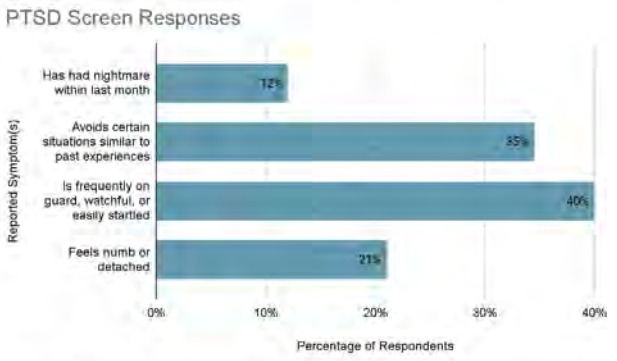

Figure x: 88% of all respondents (n=267) reported exposure to at least 1 adverse childhood experience (ACE) or community violence. The 235 respondents endorsing these exposures reported PTSD symptoms as described above

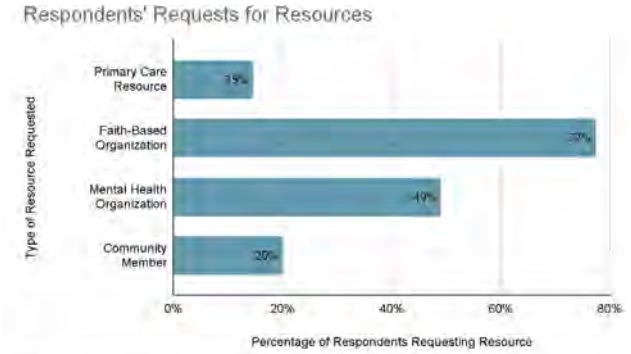

Figure x: Thirty-eight percent of all respondents' with at least 1 adverse childhood experience (ACE) requested resources involving primary care clinics (e.g., discussion with primary care physician), faith-based organizations (e.g., discussion with pastor/priest, church attendance, bible study participation), mental health organizations (e.g., discussion with social worker, counselor), and/or community member support.

No, authors do not have interests to disclose

383 What Aminotransferase Values Are Clinically Important After Acetaminophen Poisoning?

Kaiser S, Spyker D, Hoyte C, Dart R, Rumack B, Yarema M/Rocky Mountain Poison and Drug Safety, Denver, Colorado, US

Study Objective: Acute acetaminophen ingestion management includes plotting an acetaminophen concentration on the population-based Rumack-Matthew Nomogram. Nomogram implementation reflects an estimate of probability of hepatotoxicity (defined as aspartate or alanine aminotransferase >1,000 IU/L) based on ingestion time and acetaminophen concentration. Similarly, patients with unknown or repeated supratherapeutic acetaminophen exposure are treated with acetylcysteine to mitigate liver injury. Antidote efficacy is time sensitive, however, once hepatotoxicity is identified patients often have extended hospital courses and acetylcysteine administration. Currently, it is unclear if there is an aminotransferase threshold associated with clinically significant outcomes.

Methods: This was a secondary analysis of compiled datasets of patients treated for acetaminophen poisoning including; the Canadian Acetaminophen Overdose Study (CAOS) database, a retrospective medical record review between 1980 and 2005, (IV NAC) a multicenter, prospective, single-arm, open-label study from 1984-1991, and (US-NMS) a multicenter open study between 1976 and 1985. Descriptive statistical analysis was performed comparing peak aminotransferase elevation, time to peak aminotransferase elevation, and severe coagulopathy (defined as INR greater than 6.5) amongst patients who recovered from acetaminophen poisoning compared to those had severe outcomes (hepatotoxic deaths or received a liver transplant). Primary outcome was peak aminotransferase elevation. We selected patients with all of the following: 1. Known outcome (recovery, liver transplant, death); 2. At least one toxic acetaminophen concentration (as determined by Rumack-Matthew Nomogram); 3. Detectable acetaminophen concentration at time of presentation; and 4. At least one recorded aminotransferase value.

Results: 13,694 charts were reviewed, and 7,244 met inclusion criteria for analysis. 7,119 (98.27%) patients recovered, 15 received liver transplants (0.21%), 110 patients died (1.50%). Of the deaths, 80 developed hepatotoxicity (comprising 1.11% of the total cohort). Of those patients presenting after an acute ingestion (ingestion spanning 8 hours or less), the minimum peak aminotransferase was 1,795 U/L. Median peak aminotransferase amongst patients who recovered was 32 U/L (IQR 21-90), whereas those amongst patients who died or received liver transplants were 6,977 U/L (IQR 4,122-11,952) and 3,000 U/L (IQR 32-9,545), respectively. In our analysis we found 986 patients had maximum aminotransferase greater than 1000 U/L, of these, 895 survived.

Conclusion: Fulminant liver failure and death are rare outcomes in acetaminophen toxicity. In our analysis, greater than 90% of patients with peak aminotransferase greater 1,000 U/L recovered. While we found overlap in the total range of aminotransferase elevation between patients with severe outcomes as compared to those who did not, patients who died or received a liver transplant were more likely to be severely coagulopathic, with aminotransferases peaking 2-4 days post ingestion and have markedly elevated aminotransferases. Further analysis is needed to identify these patients sooner in their course as early adjunctive therapeutic management may limit hepatic injury and potentially decrease mortality and morbidity.

Table 1; Clinical Characteristics per Outcome

Characteristic	Hepatotoxic Death (n=80)	Liver Transplant (n=15)	Recovery (n=7119)
Mean Age, years (range)	38 (4-77)	28.5 (9-57)	26.7 (0-100)
Female sex, %	45 (56.3%)	11 (73.3%)	4960 (69.7%)
NAC Administered, no. (%)	73 (91.3 %)	15 (100%)	6558 (92.1%)
Median Presenting [APAP], mcg/mL (IQR? Range?)	42.5 (16.9-101)	61.2 (7.3-176)	106 (34-189)
Median time to NAC, hours (IQR)	52.5 (28.5-88.0)	43.4 (8.9-102)	9.8 (6.5-17.3)
Median Time to Peak aminotransferase, hours (IQR)	65.9 (47.4-90.6)	60.9 (26.2-99.1)	30.6 (12.3-60.7)
Median peak aminotransferase, U/L (IQR)	6,977 (4,122-11,952)	3,000 (32-9,545)	32 (21-90)
Median Peak INR (IQR)	6.7 (4-11.5)	7.1 (1.1-10)	1.1 (1-1.4)
Severe Coagulopathy*, no. (%)	42 (52.5%)	8 (53.3%)	448 (6.3%)

*Severe coagulopathy defined as INR greater than 6.5

No, authors do not have interests to disclose

385 Incidence of Pulmonary and Cardiac Abnormalities on Point-of-Care Ultrasound in Adults With Post-acute COVID Syndrome: A Prospective Cohort Study

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Study Objectives: After recovery from acute infection with COVID-19, patients can suffer from a range of subacute to chronic symptoms, known as "post-acute COVID syndrome" (PACS). Point-of-care ultrasound (POCUS) is used extensively in patients presenting with acute COVID-19, especially focusing on the heart and lungs, but the utility of POCUS in PACS is not clear. Our study objective was to determine the incidence of cardiac and pulmonary abnormalities found with POCUS in patients presenting to a COVID-19 Recovery clinic which specializes in the evaluation of patients with PACS.

Methods: We conducted a prospective cohort study including adult (>18 years of age) patients presenting with cardiopulmonary symptoms to the COVID-19 Recovery Clinic at a tertiary care urban hospital.

Ultrasounds were performed by one of five emergency physicians – four ultrasound faculty and one fellow within the last month of fellowship. A 12-zone lung ultrasound and a standard four-view bedside echocardiogram were performed. Images were interpreted in real-time by the performing sonographer and also independently interpreted by a blinded ultrasound faculty member. Any discrepancies in interpretation were addressed by a consensus of three of the ultrasound faculty members. A modified Soldati score was calculated based upon the sum of the scores in each of twelve lung zones, with normal lung receiving a score of 0 and dense white lung with/without consolidation receiving a score of 3. The maximum modified Soldati score was 36.

Results/Findings: Between April and July 2021, 41 patients received lung and cardiac POCUS examinations. Of those 41 patients, 24 patients were included in the study. The other 17 patients were excluded after chart review revealed no definitive prior COVID-19 testing with PCR or antibody testing. Fifteen out of 24 patients (62.5%) had a completely normal 12-zone lung ultrasound. Of the nine subjects with lung abnormalities, the median modified Soldati score was 2 (IQR 1-3, range 1-8). Three out of 24 patients had trivial pericardial effusions, and all had normal left and right ventricular size and function.

Conclusion: The majority (62.5%) of patients presenting to a dedicated clinic for the care of post-acute COVID-19 have a normal pulmonary ultrasound, and the vast majority (87.5%) had a normal cardiac ultrasound, with trace/trivial pericardial fluid

being the only cardiac abnormality found. This suggests that cardiopulmonary symptoms in PASC may have different etiologies than acute COVID-19.

No, authors do not have interests to disclose

386 Common Health-Harming Legal Needs of Patients Seeking Care in the Emergency Department: Support for Emergency Department-Based Medical-Legal Partnerships

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Study Objectives: An individual's health and health outcomes are intimately linked to social and environmental factors. Addressing these underlying factors can positively impact the health of an individual and community. Medical-Legal Partnerships (MLPs) have been shown to positively impact health outcomes and target social determinants of health (SDoH) by providing referrals to legal partners to address health harming legal needs that, if unmet, can lead to adverse health outcomes. MLPs are associated with decreased emergency department (ED) visits, decreased hospitalizations, improved health outcomes, increased routine primary care visits, and are significant cost savings to health systems. The objective of this study was to explore the most common health-harming legal needs of patients seeking care at Grady Memorial Hospital (GMH) ED, a public safety net hospital in Atlanta, GA.

Methods: This was a cross sectional survey study of a convenience sample of patients seeking care in the ED during an eight-month period. Participants completed a health-harming legal needs survey developed from validated MLP survey tools, and with input from local legal partners. Survey questions focused on legal needs, including financial issues, access to benefits, housing challenges, access to insurance/benefits, guardianship and custody, domestic violence, and immigration barriers.

Descriptive statistics were calculated for categorical variables and an exploratory factor analysis was conducted to identify related factors.

Results: Among 205 survey participants, 170 (82.9%) reported at least one health-harming legal need. The most common need pertained to financial issues (bankruptcy, collections, paying for medications and medical bills) endorsed by 88 (51.8%) patients. Concerns about access to benefits (SSI, SSDI, WIC, social security) was the second most common need reported by 62 (36.5.%) participants. A total of 143 (84.6%) of patients expressed interest in discussing the surveyed legal issues with a lawyer if one were available. Related factors included socioeconomic concerns defined as financial issues, job, food and housing insecurity, concerns about custody/guardianship and concerns about domestic violence, and access to public benefits (SSI, SSDI, WIC, social security, medicaid, medicare).

Conclusion: Patients presenting to the ED reported a number of health harming legal needs. While several MLPs exist in health settings, few directly serve or are accessible to ED patients. As health harming needs are common in the ED, ED-based MLPs may serve as an innovative approach to address social needs and social determinants of health of patients seeking care in ED settings. Further research is warranted to understand best practices for implementation and assessment of ED-based MLPs and more specifically their impact on ED and hospital utilization, health status, and social needs.

No, authors do not have interests to disclose

388 Effect of Applying a Real-Time Medical Record Input Assistance System With Voice Artificial Intelligence on Triage Task Performance in the Emergency Department: A Prospective Interventional Study

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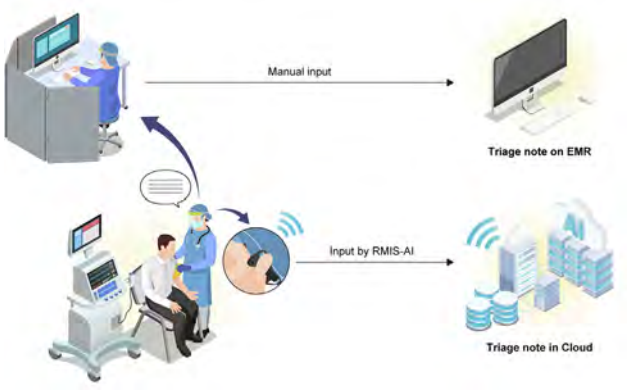
Study Objective: In this study, we investigated the promptness and reliability of a real-time medical record input assistance system with voice artificial intelligence (RMIS-AI) and compared it to the manual method for triage tasks in the emergency department.

Method: We performed a prospective interventional study. From June 4, 2021, to September 12, 2021, RMIS-AI, using a machine learning engine that was trained with 1,717 triage cases over six months, was prospectively applied to clinical practice in a triage unit. We analyzed a total of 1,063 triage tasks performed by 19 triage nurses who agreed to participate. The primary outcome was the time for participants to perform the triage task.

Results: The median time for participants to perform the triage task was 204 (155,277) s by RMIS-AI and 231 (180,313) s using manual method; this difference was statistically significant ($P < 0.001$). Most of the variables required for entry in the triage note showed a higher record completion rate by the manual method, but in the recording of additional chief complaints and past medical history, RMIS-AI showed a higher record completion rate than the manual method. Categorical variables entered by RMIS-AI showed less agreement compared with continuous variables, such as vital signs.

Conclusion: RMIS-AI improves the promptness in performing triage tasks compared with the manual input method. However, to make it a reliable alternative to the conventional method, technical supplementation and additional research should be pursued.



No, authors do not have interests to disclose

389 Emergency Department Nursing Staffing Has Significant Financial Consequences for Patients, Hospitals, and Clinicians

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Background: Emergency departments (EDs) have experienced increases in patient boarding, which has resulted in significant challenges to providing quality care. The COVID pandemic has exacerbated ED crowding despite reduced ED volumes nationally, which is in part due to national ED nursing shortages. Nursing-specific operational inefficiencies can have detrimental financial consequences for the ED and hospitals.

Study Objectives: There were two primary objectives: 1) To quantify the amount of ED beds unavailable due to nurse-staffing challenges 2) To estimate the financial impact of this reduced capacity on the ED.

Methods: A retrospective, cohort review of all ED encounters from January 1, 2021 - December 31, 2021, was identified at our large, academic, safety-net trauma center. Performance metrics were retrieved from a novel, interactive, digital data dashboard at the Zuckerberg San Francisco General Hospital (ZSFGH). Average daily staffed nursing beds were obtained during two key time points daily: 11am and 7pm from Q4- 2021 (October 1, 2021 – December 31, 2021) and extrapolated for the calendar year. Total unavailable ED bed minutes were determined based on nursing staffing as were total potential missed encounters due to unavailable ED beds. These were estimated using the average LOS for ED encounters. Average institutional ED charges and realized payments were then used to determine a financial estimate of the impact of the nursing shortage during Q4-2021 and annualized for 2021. We assume, based on pre-pandemic census data, that there is sufficient ED demand and volume to occupy all available ED beds.

Results: The ZSFGH is a 59-bed ED that when maximally staffed has a weighted average of 56.25 beds daily, accounting for nighttime closures. During the review period, the average daily nursing-staffed beds during Q4-2021 were 47.7 (84.7%). From January 1, 2021 – December 31, 2021, there were 57,888 encounters of which 53,012 (91.6%) were included and 4,876 (8.4%) were excluded due to alternative dispositions such as Absent Without Leave (AWOL), Left Without Being Seen (LWBS), Left Without Being Triaged (LWBT) and Nursing Referrals (RN Referrals). The total unstaffed ED bed minutes was an estimated 4,511,400. The average LOS excluding AWOL, LWBS, LWBT, RN Referrals, and Against Medical Advice (AMA) during this time period was 411 minutes resulting in an estimated 10,977 potential missed encounters, an estimated $8.56M in lost potential charges, and $1.97M in potential lost revenue [Figure 1]. During the pre-pandemic period with available data (August 1, 2019 – February 29, 2020) when boarding and nursing staffing weren't as limited, the daily census was 184.1 patients, excluding LWBS, LWBT, and RN Referrals with an average LOS of 407 minutes for a total daily bedtime of 74,929 minutes for a utilization of 92.5%. During this period, the total daily census with LWBS, LWBT, and RN Referrals was 210.1 patients. These additional patients would account for another 10,582 bed minutes for a total bed utilization of 85,511 mins (105.6%).

Conclusion: The COVID pandemic has resulted in increasing challenges for already strained EDs. Increasing national nursing shortages reduce operational performance and result in a significant financial loss to EDs. Greater attention to the financial consequences of nursing shortages on EDs may allow for improved resource allocation, capacity recovery, and financial performance.

Yes, authors have interests to disclose
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Disclosure: Inflammatix
Consultant/Advisor
Inflammatix

392 The Waiting Game: Emergency Department Boarding and Its Financial Costs for Patients, Hospitals, and Clinicians

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Background: Emergency departments (EDs) have experienced increased patient boarding even before the pandemic which has led to significant challenges for both patients and clinicians. The COVID pandemic has only exacerbated ED crowding despite reduced ED volumes nationally. ED boarding has been erroneously attributed to inefficient ED practices but is often largely the result of hospital and systemic inefficiencies. While ED boarding is not solely an ED problem, the financial impact of boarding on the ED can be significant and the cost of ED crowding is often largely borne by already overburdened EDs.

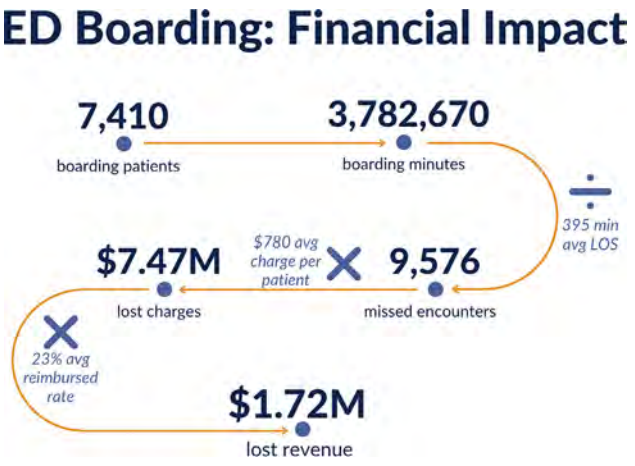
Study Objectives: There were two primary objectives; 1) To quantify the number of ED beds occupied by inpatient boarding patients, 2) To estimate the financial impact of boarding on the ED in a large, academic, safety-net hospital.

Methods: A retrospective, cohort review of all ED encounters from July 1, 2020, through June 30, 2021, were identified at our large, academic, safety-net trauma center. Performance metrics were retrieved from a novel, interactive, digital data dashboard at the Zuckerberg San Francisco General Hospital (ZSFGH) including average Length of Stay (LOS) and Total Boarding Minutes. Boarding was defined as time spent occupying an ED bed beyond 120 minutes after the admit disposition was determined as defined by the Agency for Healthcare Research and Quality (AHRQ). An estimate of total missed encounters due to ED boarding time was made and total potential charges and revenue were then estimated using an institutional average of estimated charges as well as average realized reimbursement rate.

Results: There were a total of 54,612 encounters, of which 50,980 (93.3%) were included and 3,632 (6.7%) were excluded due to alternative dispositions, such as Absent Without Leave (AWOL), Left Without Being Seen (LWBS), Left Without Being Triaged (LWBT) and Nursing Referrals (RN Referrals). Included were 11,850 (23.2%) admissions and 39,130 (76.8%) discharges and transfers. Total annual boarders were 7,410 (62.5%) with a total of 3,782,670 boarding minutes. The mean LOS for our ED patients during this period was 395 minutes (753 for admissions and 288 for discharges and transfers) resulting in an estimate of potential missed encounters of 9,576. The institutional average charge for all-comers to the ED is $780. At 9,576 missed encounters, an estimate for potential lost charges was $7.47M and at an average reimbursement rate of 23%, potential revenue loss of $1.72M [Figure 1].

During the pre-pandemic period with available data (August 1, 2019 – February 29, 2020) when boarding and nurse staffing were not as limited, the daily census was 184.1 patients, excluding LWBS, LWBT, and RN Referrals. During the pandemic period with significant ED boarding and nursing staffing shortages, the daily census was 149.6. Including the potential daily missed encounters of 26.2 would result in a total potential daily census of 175.8. Thus, we assume there would be sufficient patient volume and demand to occupy all available ED beds if boarding were eliminated.

Conclusion: ED boarding is due to systemic health care system failures but results in significant lost ED revenue further straining already over-burdened EDs. Improving hospital patient flow can improve ED patient flow and revenues both during and after the COVID pandemic.



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Consultant/Advisor
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395 Is Lower Extremity Venography Necessary in Pulmonary Embolism CT Imaging?

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Study Objective: Pulmonary thromboembolism (PTE) is the third most mortal disease after acute myocardial infarction and cerebrovascular events. Ten percent of patients with pulmonary embolism also have deep venous thrombosis (DVT). Point-of-care compression ultrasound (PoCUS) is performed in the emergency room to detect the DVT of the patients, and doppler ultrasonography is performed by the radiology physicians. In addition to pulmonary computerized tomography (CT) angiography, lower extremity venography is also performed.

Although contrast venography is the gold standard for the diagnosis of DVT, PoCUS is increasingly used in the emergency department (ED) for the evaluation of lower extremity DVT. In our study, we aimed to investigate whether lower extremity venography is necessary for patients with pulmonary embolism as it may pose a risk in terms of radiation and contrast material.

Methods: This research is a single-centered, cross-sectional, retrospective study that is conducted in a university hospital. Information about patients who were admitted to the ED between 1 March 2021 and 28 February 2022 and got diagnosed with pulmonary embolism was collected from the hospital database. Patients who were younger than eighteen years old, pregnant and who had not been scanned for PTE were excluded. The primary outcome was to determine the necessity of lower extremity CT venography for PTE. The secondary outcome was to determine the mortality and morbidity of the patients and the factors that affect those rates

Results: A total of 200 patients were included in the study. 54.5% of the patients were female (n=109). The median age of the patients was 74.50 [63.25-82.00]. Eight (4.0%) of the patients died in the emergency department. Twenty-one (10.5%) patients were discharged due to low risk. Of the 171 hospitalized patients, 54 (31.6%) were admitted to the intensive care unit. While 143 of the hospitalized patients were discharged, 28 (16.4%) died in the hospital. Since the study covered the COVID-19 pandemic period, 26 patients had COVID-19 PCR positivity. DVT was detected in 32 (16.0%) of the patients who underwent CT in the emergency department. Since the arrival in the emergency department, 164 of the patients were discharged and 36 of them died. According to survivor and non-survivor patients, median age, gender, clinical suspicion of DVT (Wells score and PoCUS), Wells pre-test risk score groups, PTE localization on CT, DVT finding on CT, treatment, hospitalization, COVID-19 positivity, length of hospital stay and D-Dimer levels are shown in Table 1. Patients diagnosed with PTE in the emergency department according to DVT are shown in Table 2.

Conclusion: The diagnostic value of PoCUS performed in the ED was found to be high in our study. It shows us that CT venography used in the diagnosis of PTE can be replaced by PoCUS, which is cheaper, has less risk of contrast allergy and has a low radiation rate. However, there is a need for more studies on this subject because the presence of DVT was missed with POCUS in patients with a mortal course.

No, authors do not have interests to disclose

Table 1. Patients Diagnosed with PTE in The Emergency Department

	Survivor n=164	Non-survivor n=36	P value
Female, n(%)	90 (54.9)	19 (52.8)	0.819
Age, years [IQR]	73.5 [60.3-81.0]	78.5 [72.0-87.0]	**0.006**
DVT suspicion on physical exam, n (%)	147 (89,6)	29 (80.6)	0.155
POCUS on DVT, n(%)	143 (87.2)	30 (83.3)	0.590
PTE-Wells score, [IQR]	1.50 [1.12-3.75]	4.50 [2.50-7.00]	**<0.001**
PTE-Wells risk, n (%)			
-Low	35 (24.5)	0	**<0.001**
-Moderate	99 (69.2)	19 (67.9)	
-High	9 (6.3)	9 (32.1)	
D-Dimer, mg/L [IQR]	3.89 [1.89-10.72]	14.92 [6.35-45.76]	**<0.001**
PTE localization on CT, n(%)			
-Main branch	62 (37.8)	24 (66.7)	**0.002**
-Segmental	119 (72.6)	22 (61.1)	0.173
-Subsegmental	20 (12.2)	4 (11.1)	1.000
DVT on venography, n (%)	23 (14.0)	9 (25.0)	0.104
Treatment, n (%)			
- Fibrinolytic	8 (4.9)	9 (25.0)	**0.001**
- LMWH	121 (73.8)	7 (19.4)	**<0.001**
- UFH	45 (27.4)	25 (69.4)	**<0.001**
Ward, n (%)	109 (76.2)	8 (28.6)	**<0.001**
Intensive Care Unit, n (%)	34 (23.8)	20 (71.4)	**<0.001**
COVID-19 PCR +, n (%)	21 (12.8)	5 (13.9)	0.790
Lenght of stay, days [IQR]	7.0 [5.0-10.0]	5.5 [1.0-14.8]	0.388

Abbreviations: CT: Computed Tomography, DVT: Deep Venous Thrombosis, IQR: Interquartile Range, LMWH: Low Molecular Weight Heparin, PCR: Polimerase Chain Reaction, POCUS: Point-of-Care Ultrasound, PTE: Pulmonary Thromboembolism, UFH: Unfractioned Heparin.

Table 2. Patients Diagnosed with PTE in The Emergency Department According to DVT

	DVT + (n= 32)	DVT - (n=168)	P value
Female, n(%)	20 (62.5)	89 (53)	0.321
Age, years [IQR]	73.0 [52.2-81.0]	75.0 [65.2-82.0]	0.381
DVT suspicion on physical exam, n (%)	17 (53.1)	7 (4.2)	**<0.001**
POCUS on DVT, n(%)	21 (65.6)	6 (3.6)	**<0.001**
PTE-Wells score, [IQR]	5.0 [3.0-7.5]	1.5 [1.5-3.0]	**<0.001**
PTE-Wells risk, n(%)			
-Low	35 (24.5)	0	
-Moderate	99 (69.2)	19 (67.9)	**0.001**
-High	9 (6.3)	9 (32.1)	
D-Dimer, mg/L [IQR]	9.03 [3.33-29.35]	4.20 [1.94-13.81]	**0.015**
PTE localization on CT, n(%)			
-Main branch	18 (56.3)	68 (40.5)	0.099
-Segmental	21 (65.6)	120 (71.4)	0.509
-Subsegmental	4 (12.5)	20 (11.9)	1.000
Treatment, n(%)			
-Alteplase	2 (6.3)	15 (8.9)	1.000
-LMWH	19 (59.4)	109 (64.9)	0.522
-UFH	14 (43.8)	56 (33.3)	0.258
Emergency Depertmant outcome, n(%)			
-Discharged	1 (3.1)	20 (11.9)	
-Hospitalization	31 (96.9)	140 (83.3)	0.169
-Exitus	0	8 (4.8)	
Admission to, n(%)			
-Ward	22 (65.6)	95 (67.9)	0.736
-Intensive Care Unit	9 (28.1)	45 (32.1)	
Hospital Outcome, n(%)			
-Discharged	22 (65.6)	121 (86.4)	**0.035**
-Exitus	9 (28.1)	19 (13.6)	
COVID-19 PCR +, n (%)	4 (12.5)	22 (13.1)	1.000
Lenght of stay, days [IQR]	6 [5-10]	7 [4-11]	0.830

Abbreviations: CT: Computed Tomography, DVT: Deep Venous Thrombosis, IQR: Interquartile Range, LMWH: Low Molecular Weight Heparin, PCR: Polimerase Chain Reaction, POCUS: Point-of-Care Ultrasound, PTE: Pulmonary Thromboembolism, UFH: Unfractioned Heparin.

397 Assessment of Sociodemographic Disparities in Emergency Department Pain Management

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Study Objectives: Decades of research have demonstrated sociodemographic disparities in medical practice, including the treatment of acute and chronic pain. Our study aims to identify sociodemographic variations in pain management for adult patients across 21 emergency departments (ED) in a Northern California integrated health care system. Results will provide a granular understanding of current practice patterns in acute pain management in our EDs.

Study Design/Methods: This retrospective, data-only, cohort study of adult patients who presented to the ED with a chief complaint of abdominal pain from 1/1/2019 to 12/31/2020 aims to assess for variations in the receipt of an opioid pain reliever (OPR) according to patient sociodemographic characteristics (primary exposure: self-reported race/ethnicity; secondary exposures: age, sex, and primary language). The primary aim was to evaluate if specific patient characteristics are associated with a decreased likelihood of receiving an OPR as part of acute pain management.

Results/Findings: In multivariable analyses, adjusting for key confounders, we estimated the odds ratios and associated 95% confidence intervals for receiving an OPR by race/ethnicity, sex, primary language, and age (see Table.1). After controlling for several demographic and clinical variables including severity of illness, results show significantly lower odds of receiving an OPR among Asian, Black and Hispanic patients (compared to White patients), patients over 75 years (compared to 18-30 years) and non-English primary language speakers (compared to English speakers). No significant difference was seen with regards to sex (female vs male).

Conclusion: While this study did not attempt to assess the clinical appropriateness of less or more opiate use, consistent with other published studies, our study demonstrates that significant sociodemographic disparities exist in the management of acute pain in the ED. To address these disparities, future initiatives will focus on system level changes, including the modification of triage protocols and the creation of pain management order-sets. The consistent use of standardized order-sets has the potential to decrease variation in pain management. Further studies are warranted to evaluate if these interventions are effective.

Table 1. Adjusted odds ratio (OR) of receiving an OPR by race/ethnicity, sex, age, language, and severity of illness.

Variables	OR of receiving OPR [95 % Confidence Interval]
Race/Ethnicity (reference=non-Hispanic White)	
Black (including Black-Hispanic)	0.74 [0.71, 0.77]
Hispanic	0.87 [0.84, 0.90]
Asian/Pacific Islander (including Asian Hispanic)	0.70 [0.68, 0.73]
Sex (reference=Male)	
Female	0.99 [0.96, 1.01]
Age (reference = 18-30 years)	
76 years and older	0.85 [0.80, 0.90]
Primary Language (reference=English)	
Non-English	0.87 [0.84, 0.91]
Severity of illness (reference = Urgent Acuity level) *	
Resuscitative/ Emergent	1.68 [1.62, 1.75]
Minor/ Non-Urgent	0.11 [0.06, 0.19]

*Note: Severity of illness is a five-level scale based on the "Emergency Severity Index" triage scale. Urgent is the mid-level of acuity (Level 3 out of 5), Resuscitative and Emergent are Levels 1 and 2, and Minor and Non-urgent are levels 4 and 5, respectively. We also adjusted for neighborhood median household income, insurance status, and ED disposition.

No, authors do not have interests to disclose

EMF

398 Mode of Respiratory Support and Mortality in Patients With Acute Hypoxemic Respiratory Failure from COVID-19

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Study Objectives: The optimal method of respiratory support for patients with acute hypoxemic respiratory failure from COVID-19 is unclear. Early advice was generally to intubate patients, while later advice was to aggressively use noninvasive respiratory support (high flow nasal oxygen or noninvasive positive pressure ventilation) to avoid mechanical ventilation. The goals of this study are to use a large data set from a large hospital system in the western United States to retrospectively evaluate: 1.) outcomes in patients treated with early invasive mechanical ventilation versus noninvasive respiratory support, and 2.) outcomes between the two modes of noninvasive support.

Methods: We utilized inverse probability of treatment weighted cause-specific Cox proportional hazard models, where participants that died are censored at the time of death. Models include predictors for age, body mass index, ethnicity, first treatment assignment, sex, hospital size, white race, respiratory rate (breaths/min), the ratio of oxygen saturation by pulse oximetry to the fraction of inspired oxygen (SPO2/FIO2), and first treatment start in days after hospital admission. Multiple imputation by chained equations was used to construct 50 imputation datasets. Then, for each data set, propensity scores for the probability of receiving a given first treatment were estimated using generalized boosted models with four stopping criteria to balance the groups. For each imputation data set, a weighted model using the propensity scores from the generalized boosted models was fit.

Results: During the study period there were 2354 COVID-19 patients who met criteria for inclusion. There was an increased hazard of dying associated with noninvasive respiratory support compared to invasive mechanical ventilation (HR: 1.61, $p < 0.0001$, 95% CI: 1.35 - 1.93) in the of time to in-hospital death model. High flow nasal oxygen showed an increased hazard of dying compared to noninvasive positive pressure ventilation (HR: 1.59, $p = 0.0001$, 95% CI: 1.27 - 2.00). The cause-specific hazard model of days from hospital entrance to live hospital exit with death treated as a competing risk showed an increased probability of leaving the hospital alive for those initially treated with noninvasive respiratory support compared to invasive mechanical ventilation (HR: 1.71, $p < 0.0001$, 95% CI: 1.47 - 1.99). Patients initially treated with either high flow nasal oxygen (HR: 1.34, $p = 0.0455$, 95% CI: 1.01 - 1.79) or noninvasive positive pressure ventilation (1.72, $p < 0.0001$, 95% CI: 1.48 - 2.01) had increased probabilities of leaving the hospital alive compared to invasive mechanical ventilation. There was not a statistically significant difference in the hazard of live hospital exit between high flow nasal oxygen and noninvasive positive pressure ventilation (HR for noninvasive positive pressure ventilation vs. high flow nasal oxygen: 1.28, $p = 0.0972$, 95% CI: 0.96 - 1.72).

Conclusion: These data showed that for patients with COVID-19, noninvasive respiratory support presented a paradox for outcomes. Patients were less likely to survive, but those that did survive were discharged from the hospital sooner than if they had been intubated early. Future work should focus on early identification of patients failing noninvasive respiratory support to avoid excess mortality.

Yes, authors have interests to disclose

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399 Racial and Ethnic Variation in Emergency Department Disposition and Access to Hospital-Based Care

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Background/Study Objective: The emergency department is the primary portal through which patients access hospital-based care. Medicaid beneficiaries and uninsured patients experience higher rates of interhospital transfer and are discharged at higher rates compared to patients with private insurance. Black and LatinX patients are the most likely racial and ethnic group patients to be uninsured and rely on Medicaid coverage. The primary aim of this study was to examine the association between race

and ethnicity and ED discharge, transfers, and admission independent of insurance status.

Methods: A cross-sectional analysis of a national sample of adult ED visits between January 2019 to December 2019 was conducted using the Nationwide Emergency Department Sample (NEDS). ED visits for common pulmonary conditions which do not typically require specialized medical care beyond mechanical ventilation were included. To reduce confounding of medically necessary transfers, only ED visits made to hospitals with demonstrated intensive-care capability were included. The primary outcome was final disposition from the ED categorized as discharge home or to post-acute care, same hospital admission, or transfer to another hospital for short-term hospitalization. The main predictor of interest was patient race and ethnicity, defined as White, Black, Hispanic, Asian/Pacific Islander, Native American, or Other. Logistical regression models with random effects for hospital were used to estimate the odds of ED discharge and transfer compared to same hospital admission, adjusting for patient age, sex, insurance status, rural residence, median household income of patient zip code, and medical comorbidity using the Charlson Comorbidity Index.

Results: A total of 3,573,471 ED visits for pulmonary conditions to 539 hospitals were included in the study sample. Patients were median age (interquartile range) 59 (42-72) years. ED visits were predominantly made by female patients [2,107,339 (59.0%)] versus male [1,465,967 (41.0%)]. The total number of ED visits per racial and ethnic category was Asian/Pacific Islander 60,168 (1.7%); Black, 812,293 (23.0%); Hispanic, 394,452 (11.2%); Native American, 13,777 (0.4%); White, 2,160,513 (61.2%); and Other race 90,680 (2.6%). Most visits were insured through Medicare [1,713,872 (48.0%)] versus Medicaid [836,594 (23.4%)]; private insurance [641,123 (17.9%)]; self-pay [304,331 (8.5%)]; other insurance [77,551 (2.2%)]. Compared to White patients, the adjusted odds of ED discharge was higher for Black [aOR 1.46, 95% CI 1.45, 1.47], Hispanic [aOR 1.36 , 95% CI 1.35, 1.38], Native American [aOR 1.15, 95% CI, 1.10, 1.20], and Other race patients [aOR 1.12, 95% CI 1.10, 1.14] but lower for Asian/Pacific Islanders [aOR 0.97, 95% CI 0.95, 0.99]. The adjusted odds of ED transfer was higher for Black [aOR 1.12, 95% CI, 1.08; 1.16] and Native American [aOR, 95% CI 1.02, 1.47] patients but lower for Hispanic patients [aOR, 95% CI 0.86, 0.95].

Conclusion: Irrespective of insurance, ED visits made by Black, Hispanic, and Native American patients were more likely to result in discharge from the ED. This difference in disposition outcomes could be due to institutional structures and policies including financial incentives, bias and standardization of historically racist care patterns that impede access to hospital care among minoritized racial and ethnic groups seeking ED care.

No, authors do not have interests to disclose

400 Implementation of Geriatric Clinical Decision Support in the Emergency Department to Optimize Use of Potentially Inappropriate Medications

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Study Objectives: Patients ≥ 65 years of age are at increased risk of adverse drug events (ADE) from certain medications and recent literature suggests use of potentially inappropriate medications (PIMs) in emergency departments (ED) and hospitalized older adults may be associated with increased risk of re-admission and ADEs. Clinical decision support (CDS) may minimize and optimize the use of PIMs for older adults in the ED and at ED discharge.

The goal of this study was to assess the use of geriatric CDS to optimize prescribing of PIMs in ED geriatric patients. The primary objective was to assess the proportion of targeted PIM ED orders and discharge prescriptions consistent with recommended dosing regimens before and after implementation of geriatric CDS. Secondary objectives include determining provider utilization of geriatric CDS order panels for targeted PIM ED orders and discharge prescriptions, as well as adherence to geriatric CDS recommendations when the order panels were utilized. The effect that geriatric CDS has on PIM ED discharge prescriptions remains unclear and this study aims to inform on this gap in literature.

Study Design/Methods: This was a multicenter, health-system, pre-post implementation cohort study in 18 EDs in Ohio and 1 ED in Florida. ED geriatric CDS was implemented in the electronic health record for a targeted list of 12 PIMs using order panels and included recommendations regarding dosing, preferred alternative agents, and/or medication-specific precautions determined by guideline and expert opinion. Pre- implementation data collection occurred from August-September 2021, followed by a washout period in October 2021, with post-implementation from November-December 2021. Inclusion criteria included all ED orders and ED discharge prescriptions for targeted PIMs incorporated into CDS for patients ≥ 65 years of age. Non-anxiolytic lorazepam orders were excluded from the study. Consistency with recommended dosing and post-implementation adherence was defined using the CDS criteria for each targeted PIM. The primary outcome was assessed with chi-square or Fischer's exact test, as appropriate, and secondary outcomes were assessed descriptively.

Results: A total of 6568 ED orders and 1266 discharge prescriptions were eligible for study inclusion. The proportion of targeted PIM ED orders consistent with recommended dosing regimens was higher in the post- implementation group compared to the pre-implementation group for both ED orders (53.2% vs 71.5%, $p<0.001$) and discharge prescriptions (0.6% vs 31%, $p<0.001$). In the post-implementation period, geriatric CDS order panel utilization for ordering targeted PIM orders was 62.1% and 36.7%, for ED orders and discharge prescriptions, respectively. Among orders placed through ED geriatric CDS order panels, 90.0% of ED orders and 80.4% of ED discharge prescriptions were adherent to the geriatric CDS recommendations. (Table 1)

Conclusion: Geriatric CDS implemented in the ED for targeted PIMs increased the proportion of ED orders and discharge prescriptions consistent with recommended dosing regimens. CDS can help optimize the use of PIMs for older adults in the ED.

Table 1: Medication Orders Consistent with Dosing Recommendations

	Pre-implementation Orders	Post-implementation Orders	P-value
ED Orders	**n=3330**	**n=3238**	
Cyclobenzaprine PO	80/285 (28.1)	141/231 (61.0)	**< 0.001**
Hydroxyzine PO	10/78 (12.8)	26/60 (43.3)	**< 0.001**
Ibuprofen PO	318/356 (89.3)	364/386 (94.3)	**0.013**
Ketorolac IM	55/467 (11.8)	315/412 (76.5)	**< 0.001**
Ketorolac IV	1170/1188 (98.5)	1132/1155 (98.0)	0.379
Lorazepam IV	15/464 (3.2)	53/545 (9.7)	**< 0.001**
Lorazepam PO	68/108 (63.0)	64/95 (67.4)	0.511
Metoclopramide IV	38/320 (11.9)	177/300 (59.0)	**< 0.001**
Metoclopramide PO	4/25 (4.1)	15/19 (79.0)	**< 0.001**
Tizanidine PO	14/39 (35.9)	27/35 (77.1)	**< 0.001**
Total	1772/3330 (53.2)	2314/3238 (71.5)	**< 0.001**
ED Discharge Prescriptions	**n=685**	**n=581**	
Cyclobenzaprine PO	3/338 (0.9)	113/229 (49.3)	**< 0.001**
Hydroxyzine PO	0/49 (0.0)	2/13 (15.4)	**0.041**
Ibuprofen PO	0/209 (0.0)	15/243 (6.2)	**< 0.001**
Lorazepam PO	1/19 (5.3)	0/5 (0.0)	1.000
Metoclopramide PO	0/24 (0.0)	32/44 (72.7)	**< 0.001**
Tizanidine PO	0/46 (0.0)	18/47 (38.3)	**< 0.001**
Total	4/685 (0.6)	180/581 (31.0)	**< 0.001**

Data reported as n (%) unless otherwise specified. Abbreviations: PO, By Mouth; IM, Intramuscular; IV, Intravenous.

No, authors do not have interests to disclose

403 Feasibility of Training for Ultrasound-Guided Cricothyrotomy Using a Novel 3-D Printed Training Model Simulating a Difficult Cricothyrotomy With Thick Pre-Tracheal Neck Tissue

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Study Objectives: The primary objective of this study is to assess the feasibility of using a novel 3-D printed cricothyrotomy model with thick pre-tracheal soft tissue to train learners in performing ultrasound-guided cricothyrotomy on patients whose neck anatomy is difficult to palpate.

Methods: This is a single center, cross-sectional study in a level II urban teaching hospital. Study participants included emergency medicine (EM) residents and medical students who were present at simulation didactics. A 3-D model of the neck was designed to have thick pre-tracheal soft tissue such that palpation of the landmarks for performing cricothyrotomy was difficult or impossible. The 3-D printed neck and larynx was assembled with a 2 cm thick layer of ballistic gel overlying the larynx and then covered with artificial skin. Ultrasound gel was used inside the model to facilitate visualization of tracheal structures under ultrasound guidance. During a 40 minute simulation didactic session, a 10-minute lecture was given on how to use ultrasound guidance to identify anatomic landmarks for ultrasound-guided cricothyrotomy. Learners attempted to perform cricothyrotomy on the models using palpation alone, followed by a subsequent attempt using palpation and ultrasound guidance on identical unused models. Success or failure of correct bougie insertion location, as well as the time to tracheal bougie insertion was recorded. A pre- and post-workshop questionnaire was administered.

Results: A total of 17 learners participated including 10 EM residents and 7 medical students. All 17 learners filled out pre and post-workshop surveys. For EM residents, the median (IQR) time to bougie with palpation alone was 100 sec (65-148 sec) compared to palpation with ultrasound which was 95 sec (86-120 sec). For medical students, the median time to bougie with palpation alone was 132 sec (118-166 sec) compared to palpation with ultrasound which was 160 sec (106-181 sec). There were 3 failed attempts (all characterized by incorrect bougie insertion site) with palpation alone versus only 1 failed attempt (also with incorrect bougie insertion site) while using palpation and ultrasound.

In response to their pre-workshop confidence in performing cricothyrotomy on a patient whose neck anatomy is difficult to palpate, 64.7% of learners were not confident at all, 23.5% were slightly confident, 5.9% were moderately confident, and 5.9% were very confident. After the workshop, 5.9% of learners were not confident at all, 29.4% were slightly confident, 52.9% were moderately confident, and 11.8% were very confident. 5.9% of learners were very likely to use ultrasound to assist in performing cricothyrotomy pre- workshop compared to 58.8% of learners post-workshop.

Conclusions: This novel 3-D printed cricothyrotomy model with thick pre-tracheal soft tissue provided a realistic training model for learners that successfully facilitated training in ultrasound guidance for cricothyrotomy and improved confidence in performing an ultrasound-guided cricothyrotomy on a patient with difficult airway and thick anterior neck tissue. There was a trend toward decreased failed cricothyrotomy attempts and decreased time to bougie insertion using palpation and ultrasound guidance compared to palpation alone.

No, authors do not have interests to disclose

EMF 405

Developing an Opioid Use Harm Reduction Tool for Emergency Medicine Residents

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Study Objectives: To create an accessible reference guide to teach emergency medicine providers about opiate use and harm reduction. The goals of this tool were to the provide the basics about opiate use in order to enable providers to feel comfortable discussing drug use with their patients as well as to equip providers with discreet harm reduction strategies that they can easily disseminate to their patients.

Study Design/Methods: Emergency medicine (EM) residents were interviewed about their current understanding of injection drug use and harm reduction strategies; barriers they encounter to discussing their patients' drug use; and the topics on which they wanted more education. A literature review and internet search were conducted to survey what harm reduction tools were already available and the existing evidence base for these approaches. An iterative design process was employed with EM residents to create a harm reduction reference tool. Harm reduction workers were consulted throughout development to ensure content accuracy and cultural sensitivity.

Results/Findings: Residents are interested in discussing drug use and providing harm reduction strategies to patients, but they identified lack of familiarity with the specifics of injection drug use and the language around drug use as barriers to providing this type of care. A reference guide was created for use on computer or smartphone. Design strategy emphasized usability of the tool for on shift reference. The tool provides background knowledge about each step in the process for injecting opiates, including – selecting the opiate, preparing the drug, preparing the site, and injecting. For each step, bite-sized harm reduction strategies targeting the specific potential harm associated with that step is included. Sections on reducing overdose risk and fighting stigma are also included. Slang commonly used by patients is employed throughout, alongside an accompanying glossary to define these terms.

Conclusion: Residents are in need of accessible resources to improve their understanding of drug use and harm reduction. A targeted harm reduction resource for EM residents was created to help overcome this education gap in residency training. Formal evaluation of the tool is needed in multiple practice environments to assess for impact on knowledge base and clinical practice.

No, authors do not have interests to disclose

EMF 406

Early Fluid Delivery by Emergency Medical Services for Sepsis Using a Novel Rapid Infusion Device

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Study Objectives: Early fluid resuscitation improves clinical outcomes in patients with sepsis. However, adherence to fluid delivery guidelines is less than optimal, and outcomes for patients with severe sepsis and septic shock remain poor. Emergency medical services (EMS) clinicians are tasked with initiating life-saving measures for sepsis patients, often with varied quality of care and success. Traditional fluid administration methods, including pressure bag and push-pull with manual syringe, are limited in speed of volume delivery and ease of use. We are conducting a comparative effectiveness study of a novel rapid infusion device for out-of-hospital fluid administration in patients with sepsis.

Methods: A pre-post observational study design is being used to evaluate a hand-operated, rapid infusion device (LifeFlow® Plus, 410 Medical, Durham, North Carolina) implemented in a single large EMS system in January 2022. The EMS system has an established sepsis patient care protocol with detailed guidance on out-of-hospital sepsis screening, intravenous (IV) fluid therapy, and sepsis alert criteria. Prior to implementation, EMS clinicians completed intensive education and training on device operation through didactics and simulation-based training. Study data on

patient demographics, vital signs, medical history, out-of-hospital care, and in-hospital outcomes are extracted from the EMS system electronic health record and existing data linkages with emergency department (ED) and hospital records. Eligible patients include adult and pediatric patients managed and transported by EMS under the sepsis protocol and treated with IV fluid therapy. Patients with a history of congestive heart failure or end stage renal disease on dialysis or otherwise contraindicated to fluid therapy are excluded. To assess device effectiveness, outcomes will be compared between pre- and post-implementation phases (July-December 2021 and February-July 2022, respectively) in an intention-to-treat analysis. The primary outcome is the proportion of eligible patients receiving target fluid volume (ie, at least 500 mL) prior to ED arrival. Secondary outcomes include ED/hospital discharge disposition, hospital length of stay, and in-hospital mortality. The primary outcome will be evaluated with multivariable logistic regression adjusting for potential confounders (eg, patient demographics, out-of-hospital time, and clinical factors). Secondary analyses will include the clinical outcomes, a subgroup of septic shock patients, and an as-treated analysis.

Results: We project a sample size of 525 patients and 80% power to statistically detect a minimum adjusted odds ratio of 1.7 for the primary outcome, which corresponds to 65% receiving target fluid volume in the post-implementation phase and 52% in the pre-implementation phase. Because this study is in progress, results are not available at this time. Data collection started in July 2021. Data collection and analysis will be completed in August 2022, and final results will be presented at the ACEP22 Research Forum.

Conclusion: This study will generate real-world evidence on the effectiveness of novel rapid infusion by EMS to achieve out-of-hospital fluid administration goals and to improve clinical outcomes in patients with sepsis. This research on a novel fluid delivery system will have significant impact on the field of early management of sepsis and has the potential to reduce sepsis-related morbidity and mortality.

No, authors do not have interests to disclose

EMF 407 Utilizing Simulation to Improve Pediatric Out-of-Hospital Medical Care

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Background: Pediatric patients represent 5-15% of Emergency Medical Services (EMS) transports in the United States, yet true pediatric emergencies are rare. Management of these cases remains a common area of discomfort for out-of-hospital providers. The needs of children differ from adults treated in the out-of-hospital setting. Previous studies have shown that simulation-based medical education is a useful tool to enhance patient safety in pediatrics. Simulation is an ideal modality to evaluate cognitive, technical, and behavioral skills in low frequency, high-stakes events for health care providers. Management of pediatric seizures can be complex requiring multiple seldom used skills, including pediatric intravenous linre placement, weight-based medication dosing, and advanced airway management. The complexity of seizure management coupled with its relative frequency in the out-of-hospital setting make it an ideal educational opportunity for simulation-based education.

Study Objective: We hypothesize that using a deliberate practice model with simulation through a 6-month longitudinal curriculum will improve performance among out-of-hospital providers treating pediatric seizure patients. We also evaluated provider self-efficacy and knowledge in care for pediatric seizure patients.

Methods: A prospective observational education study design of a 6-month longitudinal simulation curriculum focused on management of pediatric status epilepticus was executed. The performance of each two-member crew was analyzed during three separate simulation events. The in-situ simulations were video recorded and conducted within an ambulance, using a replica of the normal response bag. Performance was reviewed and scored by three reviewers. A comparison analysis was reported. Three different types of surveys were utilized to provide context to the simulation performance including a demographics and pediatric experience survey, a self efficacy survey and a knowledge base survey. These were given to participants at three separate time intervals during the curriculum.

Results: Thirty-nine out-of-hospital providers completed at least some portion of the curriculum. There was an improvement in provider reported self-efficacy scores across all questions, as well as improvement in pre and post-test knowledge scores. While the total number of critical actions completed did not vary significantly between simulations, there was improvement in several action items including end tidal carbon dioxide use, application of oxygen, checking of medication dosage, and administration of correct benzodiazepine dose.

Conclusions: A simulation-based curriculum on the management of pediatric seizure for EMS providers improved self- efficacy, knowledge, and performance of various critical actions in simulated settings.

No, authors do not have interests to disclose

EMF 408 Do Framing and Time Pressure Influence Diagnostic Reasoning Among Emergency Physicians?

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Study Objectives: Emergency physicians (EPs) are uniquely poised to benefit from a deeper understanding of cognitive bias, particularly as it relates to processing time. Among cognitive biases, the framing effect poses a particular challenge within emergency medicine (EM). The time pressure inherent to high-acuity care means that the amount of information received, the quality of information available, and the sequence in which information is presented can all vary profoundly between cases. Framing and time pressure have the potential to cause diagnostic error, which continues to detract from patient safety and incur high costs for physicians and the health care system alike. The purpose of this study was to detect significant changes in EP diagnostic reasoning given the imposition of a cognitive frame and time pressure.

Study Design/Methods: Board-eligible EPs and third-year EM residents at Thomas Jefferson University were invited to review two case vignettes: one consistent with pulmonary embolism (PE), the other with interstitial lung disease. Each vignette had two versions with objectively identical clinical information, but varying in frame: whether the vignette emphasized features consistent with the respective diagnosis. Subjects were randomly assigned to one of four conditions based on 1) the frame-specific or frame-non-specific version of each case and 2) the inclusion or exclusion of time pressure. Subjects provided a list of their top three differential diagnoses for each case. Non-identifiable demographic information was also collected.

Results: 39 subjects (65%) completed the study. Two-sided Fisher's exact tests showed that varying cognitive frames affected the likelihood of EPs identifying PE as a diagnosis of interest ($p = .008$, FET). Time pressure was not associated with diagnostic accuracy ($p = .091$, FET). Among EPs who identified PE, its likelihood of appearing first in their differential diagnosis was related to the imposition of frame ($p = .005$, FET) and time pressure ($p = .019$, FET). Linear regression did not reveal any significant relationships between our outcome variables and demographic characteristics, including age range, sex, and years of EM practice ($p > .05$).

Conclusion: The results of this work reveal that cognitive frame and time pressure may independently influence diagnostic reasoning among EPs. These results bear implications for medical education in EM and potential to improve patient outcomes.

Yes, authors have interests to disclose

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EMF 409 Baseline Variation in Lung Point-of-Care Ultrasound Cohorts With COVID: Implications for Prognostication

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Study Objectives: Lung point-of-care ultrasound (L-POCUS) is a novel , radiation-free diagnostic tool that could aid in COVID-19 prognosis in non-critically ill patients. Prognostication requires capturing presenting symptoms and outcomes that may change over time. Variations of environment, presenting symptomatology and follow

up can introduce uncontrolled heterogeneity impacting outcome. The purpose of our study was to examine demographic, clinical, and 40-day follow up patterns between two national sites enrolling ambulatory COVID patients for the purpose of determining the association between hypoxia at day 40 and initial L-POCUS findings.

Methods: This was a cross sectional study design of patients at two tertiary care institutions in the Northeast (NE) and Midwest (MW) from January 1st, 2021-April 30th, 2022. We included subjects with respiratory complaints who tested positive for COVID-19 and maintained oxygen saturation ≥92% for two hours after presentation to the emergency department as part of a larger project focused on describing L-POCUS prognostic characteristics in non-critically ill COVID patients. Initial vital signs and diagnostic data were collected. Blinded L-POCUS operators recorded seven lung windows (two anterior, two lateral and three posterior per lung field). We utilized a rubric that ranged from zero to six with zero being normal lung and six indicating severe lung pathology from COVID to score each image. Pleural findings included indentation, thickening (each one point), or discontinuity (two points). Parenchymal abnormalities included B lines (1-3 B lines =1 point, >3 B lines =2 points, coalescing or "waterfall" B lines=3 points). Subpleural consolidations scored an automatic six points out of a maximum of 42 per lung. Subjects received pulse oximetry use training and were followed by structured chart review or telephone interview 40-days following presentation. Telephone follow up included highest and lowest pulse oximetry at rest and on 60 second ambulatory test and a structured chart review at any health care visit documented evidence of hypoxia. Hypoxia was defined at ≤92% 40 days from index visit. We present descriptive data and corresponding parametric or non-parametric statistic.

Results: We enrolled 154 subjects (MW 122 (80%), NE 32 (21%). The NE population was more likely to be Hispanic (55% vs 18%, p=<.05) while the MW site was more likely to be African American (76% vs 42%, p<.05). There were no sex differences (NE, 63% female, MW 56% female). There were no significant differences between age (NE 40 years (IQR 31-54), MW 42 years (IQR, 30-56), or Body Mass Index (NE 29 (IQR 25-33), MW 29 (IQR, 24-35). CXR was ordered for 128 (83%) subjects and CT for 18 (12%) but there was no difference between sites (NE: CXR 27(93%), CT 5 (17%), MW: CXR 101 (83%), CT 13 (11%)). Median L-POCUS scores were 6 (IQR 5-12) and differed by site (NE 14, (IQR 13-27); MW 2 (IQR 2-10, p<.0001). Forty day telephone follow-up was 40% (59/154) and did not differ by site. We identifed 40 (26%) cases of subsequent hypoxia within 40 days of index visit. Outcome did not differ by site (NE 5/32 (16%): MW35/122 (29%), P=0.18).

Conclusions: There were no meaningful clinical differences between cohorts at distinct geographical locations although NE subjects score higher on initial L-POCUS. Telephone follow up rates were low at both sites. Prognostication may need to account for L-POCUS scoring variability.

No, authors do not have interests to disclose

EMF 410 Systematic Review of Recurrent Firearm Injury Rates in the United States

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Study Objectives: To review methodologies, data sources, and identify best practices in identification and calculation of recurrent firearm injury rates in the United States.

Methods: We conducted a systematic review of recurrent firearm injuries in the United States in accordance with PRISMA guidelines. We searched seven electronic databases on December 16, 2021 for inclusion criteria of English language, peer-reviewed journal articles that calculated recurrent firearm injury in the general population or in generalizable subgroups, like pediatric patients. We excluded studies in narrow patient populations related to interventions that could influence recurrent firearm injury, such as hospital- based violence intervention programs. Two reviewers independently screened the studies, and a third reviewer resolved conflicts. Two reviewers assessed the risk of bias and extracted data.

Results/Findings: Of 918 unique articles identified, 14 met our inclusion criteria. Reported recurrent firearm rates varied widely from 1% to 9.5%. We observed heterogeneity in study methodologies, including data sources utilized, identification of subsequent injury, follow-up times post index injury, and the types of firearm injuries studied. Data sources ranged from single-site hospital medical records to comprehensive statewide records comprising medical, law enforcement, and social security death index data. Some studies applied machine learning algorithms to electronic health records to differentiate subsequent new firearm injuries from the index injury, while others classified all repeat firearm-related hospital admissions after variably defined cut-off time for a new injury. Some studies required a minimum follow-up period of observation after the index injury while others did not. Four studies conducted survival analyses, though the specific methodology varied across these studies.

Conclusions: We found wide variability both in the data sources and methods used to define and evaluate recurrent firearm injury and in the reported recurrent injury rates. This limits individual study generalizability of individual and societal factors that may inform violence prevention interventions. There is a need to develop best practices for reporting recurrent firearm reinjury rates, as well as the development, dissemination, and implementation of standard practices for calculating recurrent firearm injury.

No, authors do not have interests to disclose

EMF 411 Measurement of Cost of Boarding Code Stroke Patients in the Emergency Department Using Time-Driven Activity-Based Costing

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Study Objectives: Emergency department (ED) boarding is associated with patient care and safety risks. However, reports show it is worsening over time. There is an abundance of research on the effects of boarding on patients, staff, and emergency department operations. However, there is a clear paucity of research into the financial effects of boarding. We sought to measure the cost of boarding code stroke patients using time-driven activity-based costing and compare how this cost related to the overall cost of inpatient care.

Methods: We studied 69, randomly chosen code stroke patients over the course of four weeks at a large, academic, level 1 trauma center. 40 patients were excluded as they left against medical advice (3), were discharged from the ED (17), not admitted to the neurology-stroke service (11), or went immediately for mechanical thrombectomy (9). The remaining 29 patients were directly observed throughout their entire boarding time and the number of physician, nurse, and technician minutes per hour required to care for each patient was calculated. These times were calculated for the inpatient side using surveys and chart review.

Results: Seven boarding patients never left the ED and five never left an admission holding area resulting in 747 hours of boarding. Seven patients required sitters for safety and on average boarded three times as long as those without sitters (61.3hrs vs. 21.7hrs; P 0.11). ED technicians were used as sitters for these patients requiring nearly two full-time equivalents per week. Nine patients had their entire boarding time directly observed and all survey data returned. These patients spent on average 20 hours of boarding in the ED (18.2% of their total hospital stay) and a total of 26 hours (23.2%) when adding time spent in the admission holding area. For these patients, ED nurses during boarding and inpatient nurses during admission did not spend a significantly different number of average minutes per hour caring for patients (9.9min vs. 13.6min; P 0.11) with nearly one-third of their time spent on charting (31.3% vs. 29.4%). Despite being admitted, patients still required ED physician attention equating 21.1min on average.

Conclusion: Despite smaller patient to nurse ratios on the floor compared to the ED at the study site, there is no significant difference in the nursing time required to care for code stroke patients who are boarding and those who are on the floor. Prolonged boarding thus puts a larger stress on ED nurse staffing due to higher patient volume requirements. In addition, patients requiring sitters waited three times as long for inpatient beds, requiring ED technicians to act as sitters for 305.8 total hours across the study period. This pattern may further exacerbate the stress on the ED and limit the workforce available to care for non-boarding patients.

Note: This is preliminary data as the EMF grant period does not end until August 2022. Financial data will be added to these findings to calculate the capacity cost rate (dollars per minute) for each role of the clinical team and summed to calculate an overall cost per hour of boarding care compared to inpatient care.

No, authors do not have interests to disclose

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3. Abstracts must adhere to the *Annals of Emergency Medicine* format with the following subheadings: title, study objectives, methods, results, and conclusion.
4. Abstracts are limited to 3000 characters not including spaces. Accepted abstracts will be published as received; no copy editing will be performed.
5. A small table or figure will be accepted. Figures must be black and white with at least 300 dpi.
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