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Letter from the Editor

Dear Reader,

Welcome to this special issue of the Medical Student Research Journal. Within you will find the abstracts accepted to the Society of Academic Emergency Medicine's Midwest Regional Meeting held in Grand Rapids, MI on September 14, 2023. These abstracts were authored by medical students and emergency medicine residents and faculty from across the country. They are a testament to SAEM's mission of furthering the practice of emergency medicine through research and education. Topics covered include point-of-care ultrasound, pre-hospital medicine, and improving access to care, among many others. Please enjoy and thank you for following MSRJ.

Sincerely,

A handwritten signature in black ink, appearing to read "Caitlin", with a stylized flourish at the end.

Caitlin Urban, MS
Executive Editor-in-Chief

The research conference was held September 14, 2023 at the L.V. Eberhard Center in Grand Rapids, Michigan. Hosted by the Michigan State University College of Human Medicine, Department of Emergency Medicine, the meeting was a full day event with clinicians and researchers from across the Midwest.

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1. Assessing the Educational Value of YouTube and TikTok Videos on Home Suture Removal

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Background and Objectives: *Many adult patients are willing and capable of removing their own nonabsorbable sutures at home if discharged from the emergency department (ED) with a suture removal kit and simple instructions. YouTube and TikTok are global online video-sharing and social media platforms that offer videos that instruct people on how to remove their sutures at home. If accurate, these videos might greatly assist ED patients with suture removal at home. However, this content is not screened and does not go through an editorial process. The purpose of this study was to evaluate the quality and educational value of these shared videos relating to suture removal at home.*

Methods: *This was a retrospective content analysis of videos available through YouTube and TikTok using specific search terms relating to suture or stitch removal. Videos without sound, duplicate content, used animals, news reports, or non-English were excluded. A standardized data abstraction form was used to collect qualitative and quantitative variables, including the number of views, sponsors, and suture removal techniques demonstrated. The quality of the instructions provided in the videos was rated using a set of 10 criteria developed by a panel of board-certified emergency physicians and classified as excellent to poor. The major study endpoint was the total number of videos that accurately described home suture removal, including risks and complications. We also identified and described the number of videos that included incorrect or misleading information. The medical claims made by the videos were classified as substantiated or unsubstantiated using the opinions of three board-certified emergency physicians. Viewers' comments from the videos were examined as an index of viewer response.*

Results: *During the study period (Feb-Mar 2023), a total of 55 YouTube and 6 TikTok videos on how to remove sutures at home were identified. The mean video length was 4.6 + 3.3 minutes (range, 10 sec to 19.03 minutes). The videos were collectively viewed 20,841,940 times with an average of 341,671 views per video. The process of suture removal was demonstrated using a live individual in 62.3% of the videos, models in 26.3%, and photographs in 11.4%. Unfortunately, none of these videos were classified as good to excellent; 21.3% were satisfactory, and 78.7% were rated poor. 23 videos (37.7%) contained incorrect information, primarily about follow-up wound care and suture removal techniques. Other problems included: poor narration, and inadequate visualization of wound or suture removal techniques.*

Conclusions: *Although there are many popular videos on social media platforms providing instructions for removing sutures, all of them were found to be lacking in important medical information, rendering them insufficient to meet patients' needs. This highlights the need for healthcare professionals to create high-quality, evidence-based self-care content for suture removal on social media platforms. By doing so, they can provide patients with accurate and reliable information that will help them properly care for their wounds and prevent complications.*

2. Quantifying Emergency Department and Emergency Medical Services Utilization in Geriatric End-of-Life Care: A Five-Year Retrospective Study within an Urban Health System

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Background and Objectives: Emergency Departments (ED) and Emergency Medical Services (EMS) play a crucial role in the continuum of care for geriatric patients nearing the end of life. This study aims to assess and quantify the prevalence and trends of ED and EMS visits among the geriatric population (Age > 65) and their subsequent needs for hospice and palliative medicine (HPM) services.

Methods: We conducted a multi-center retrospective cohort study of electronic health records from nine EDs and five hospitals within a large metropolitan health system, from January 1st, 2018, to December 31st, 2022. Data included all geriatric patients arriving at the ED or hospital via EMS and who ultimately received an upstream HPM consult ordered during their hospital encounter. A variety of patient-specific demographic, clinical, and outcome variables were collected. Over the years, we compared the incidence of geriatric ED visits, EMS arrivals, hospitalizations, and frequency of HPM consults. Data analysis included descriptive statistics, chi-square testing, and regression analysis to examine trends over time.

Results: Over the study period, there were 2,294,391 ED encounters, 378,767 EMS encounters, and 27,295 hospital encounters receiving HPM consults. Of the ED encounters, 21.90% (502,581) involved geriatric patients. Within the EMS encounters, geriatric patients constituted 44.70% (169,307). In 2018, geriatric cases made up 21.18% (101,320) of the ED pool, rising to 24.93% (107,031) by 2022 ($p < 0.01$). Of all hospital encounters that received HPM consults, 78.40% (21,399) involved geriatric patients, 69.51% (14,875) of whom arrived via EMS. In 2018, there were 3,410 geriatric HPM consults, which increased by 40.26% to 4,783 in 2022 ($p < 0.001$). For geriatric HPM encounters arriving via EMS, final dispositions revealed a 15.44% (2,297) inpatient mortality rate, with 28.96% (4,179) transferred to hospice facilities, 21.16% (3,148) to skilled nursing facilities, 12.95% (1,927) to home hospice care, and 17.33% (2,578) to home self-care arrangements.

Conclusion: One in five ED encounters in this study involved geriatric patients, emphasizing the pivotal role of EDs and EMS in geriatric end-of-life care. The findings show rising trends in geriatric ED visits, EMS involvement, and use of HPM services, highlighting the evolving landscape of care for this population.

3. The Frequency and Efficacy of Metoclopramide Use in the Emergency Department Management of Acute Ureterolithiasis

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Background and Objectives: Flank pain and vomiting are the most common presenting symptoms of acute ureterolithiasis in the emergency department (ED). Ketorolac has emerged as the first-line non-opiate treatment for renal colic, though the literature does not formally recommend a first-line antiemetic. There is some evidence to support the usage of metoclopramide for both antiemetic purposes as well as potential intrinsic ureteral smooth muscle relaxation properties. We conducted a retrospective study to identify the frequency of metoclopramide use in ED ureterolithiasis management as well as its efficacy in reducing opioid-based rescue analgesia when utilized as an adjunct to ketorolac for pain management.

Methods: We conducted a single-center, retrospective chart review identifying all patients diagnosed with ureterolithiasis via computed tomography imaging in a community ED between September 2018 and August 2019. Patients initially treated with opioids were excluded from the study. The study population was then divided into two cohorts; patients treated with ketorolac with or without ondansetron and those treated with ketorolac and metoclopramide. The primary outcome measures included the frequency of metoclopramide usage. The secondary endpoint was to quantify the proportion of each group in which further rescue analgesia with opioids was utilized. Data was summarized as counts and percentages, and categorical data were compared using Fisher's exact test.

Results: A total of 475 patients were identified with ureterolithiasis, with 179 (37.68%) receiving opiate medications as part of their initial management and excluded. 282 patients (59.37%) received ketorolac with or without ondansetron and 14 patients (2.95%) received ketorolac and metoclopramide. The proportion of patients in the ketorolac and metoclopramide group who achieved analgesia ($n = 13$, 92.86%) without opioids was higher than the ketorolac with or without ondansetron group ($n = 138$, 48.94%) and statistically significant ($p = 0.002$).

Conclusion: Metoclopramide was infrequently utilized in the management of acute ureterolithiasis in the ED of this pilot study. The findings were limited but demonstrate the potential utility of metoclopramide in treating not only the emetogenic aspect of acute ureterolithiasis, but also ureteral pain. Further studies are warranted.

4. Early Intranasal Medication Administration in Out-of-Hospital Cardiac Arrest: Two Randomized Simulation Trials

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Background and Objectives: The early use of intranasal medications to either reverse out-of-hospital cardiac arrest (OHCA) etiology or provide neuroprotection offers several advantages over traditional intravenous (IV) or intraosseous (IO) routes, including ease of use, reduced delays associated with the IV/IO routes, bypass of the blood-brain barrier, and negligible systemic absorption. The American Heart Association cautions providers to avoid delays to chest compression and defibrillation that may be associated with existing prehospital intranasal medication administration (INMA) therapy (i.e., naloxone) but suggests clinicians may consider INMA if delays can be avoided. We sought to quantify the effects of INMA in OHCA workflows.

Methods: We conducted separate randomized OHCA simulation trials with first responders and lay rescuers. Participants were randomized to groups performing hands-only cardiopulmonary resuscitation (CPR)/automated external defibrillator (AED) with or without INMA during the second rhythm analysis phase. Time to compression following the second shock was the primary outcome and compression quality (chest compression rate (CCR) and fraction (CCF)) were secondary outcomes. We fit linear regression models adjusted for service years in the first responder group and CPR training in the lay rescuer group.

Results: Among first responders we found no significant delays in time to compression following the second shock (mean diff. -2.1 seconds, 95% CI -15.9, 11.7), which persisted after adjustment ($p=0.70$), or difference in quality (CCR INMA 115.5 compressions per minute (CPM) vs. control 120.8 CPM, mean diff. -5.3 CPM, 95% CI -12.6, 2.0; CCF INMA 79.6% vs. control 81.2% mean diff. -1.6%, 95% CI -7.4, 4.3%). Among lay rescuers, INMA was associated with a significant increase in time to compression following the second shock (mean diff. 44.1 seconds, 95% CI: 14.9, 73.3) which persisted after adjustment ($p=0.005$). We observed a significant decrease in CCR (INMA 95.1 CPM vs. control 104.2 CPM, mean diff. -9.1 CPM, 95% CI -16.6, -1.6) and CCF (INMA 62.4% vs. control 69.8%, mean diff. -7.5%, 95% CI -12.0, -2.9).

Conclusions: Among first responders, time to compression following the second shock and compression quality measures did not significantly differ between groups with and without INMA. These results support the use of INMA by early first responders. However, INMA use by lay rescuers resulted in a longer time for the initiation of compressions following the second shock and reduced compression quality.

5. Prevalence and Effect of Simulation Substitution on Paramedic Educational Program Success: A National Examination

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Background and Objectives: *Paramedic education programs require sufficient rigor to prepare students to perform complex, life-saving skills. Often, exposure to direct clinical experiences is not available and simulation is substituted. However, the extent of simulation substitution and its effect on program outcomes are unknown. Our objective was to describe the prevalence of simulation substitution for clinical skills and its effect on paramedic educational program success.*

Methods: *This is a cross-sectional evaluation of all paramedic educational programs graduating students in 2019, using annual report data from The Committee on Accreditation of Educational Programs for the Emergency Medical Services Professions (CoAEMSP). This dataset includes detailed program metrics, outcomes, as well as training and administrative infrastructure. Descriptive statistics were calculated. Simulation substitution was assessed using a composite of 11 commonly taught adult/pediatric clinical skills during clinical and field internships. A multivariable logistic regression model (OR, 95% CI) was used to describe the effect of the program characteristics on first-time certifying exam success, defined as a program pass rate above 75%. The model was adjusted for the number of full-time faculty, class size, attrition rate, hours of instruction, and frequency of simulation substitution.*

Results: *A total of 690 Commission on Accreditation of Allied Health Education Programs accredited programs or those holding the CoAEMSP's Letter of Review responded to the survey, with 640 programs meeting the inclusion criterion. More than 60% (407/640) reported using simulation to substitute for at least one clinical skill. Simulation was substituted in all 11 skill categories, at least in part, by 21% (133/640) of programs. Odds of programs reporting a first-time certifying exam pass rate above 75% increased with a class size larger than 12-17 students (18-29 students: 2.39, 1.49-3.83; 30+ students: 2.23, 1.36-3.65). Odds decreased with less than 1175 hours of instruction (OR, 95% CI: less than 1070 hours: 0.51, 0.32-0.81; 1070-1174 hours: 0.48, 0.30-0.77) and simulation substitution of greater than 5 skills (6-7 skills: 0.47, 0.28-0.77; 8-10 skills: 0.55, 0.34-0.90; 11 skills: 0.56, 0.36-0.88).*

Conclusion: *The use of simulation as a substitute for clinical skills is widespread in paramedic educational programs and may lead to decreased odds of first-time program examination success if used frequently. Future research should examine individual outcomes to assess the effect of simulation substitution on entry-level competency.*

6. High Rates of CT Utilization & Comorbid Conditions Associated with Recurrent Abdominal Pain within the Emergency Department

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Background and Objectives: Recurrent abdominal pain is a common complaint within the ED, often resulting in further frustration for both patients and clinicians. Recently published emergency care guidelines in this area identified a lack of evidence in directing management of these patients including laboratory services, hospital care, and final diagnosis. Imaging with computed tomography of the abdomen and pelvis (CTAP) has surged over time with potential risks associated with radiation exposure. The primary objective of this study was to describe this patient population and assess CTAP utilization.

Methods: We performed an observational cohort study using electronic health data of adult patients with recurrent abdominal pain presenting to 8 ED sites who had a CTAP performed within the past 12 months. We excluded patients who were < 18 years of age, were pregnant, had recent abdominal surgery or instrumentation, or had a prior diagnosis of inflammatory bowel disease. We obtained clinical characteristics and reviewed outcomes over 30 days following the ED visit. Analysis was conducted using descriptive statistics and chi-square or student's t-test where appropriate.

Results: The study included 416 ED patients with recurrent abdominal pain. The mean age was 51.6 (standard deviation 16.8) years, and the median pain severity was 8 [interquartile range 7, 10]. Most participants were female (267, 64.2%), and 164 (39.5%) were Black. These patients had significant comorbid conditions, including diabetes mellitus (28.1%), heart failure (10.3%), cancer (17.6%), chronic pancreatitis (10.6%), and hypertension (56.5%). Rates of cannabis and alcohol use were 25.5% and 30.0% respectively. There were 68 (16.4%) patients who required hospitalization, including 15 (3.7%) who required an operative procedure. The median number of CTAP within the past 12 months was 1 [IQR 1, 2]. There were 44 (10.6%) patients who had 4 or more CTAP scans and 86 (20.7%) with 3 or more in the past 12 months. Differences based on race ($p=0.62$), sex ($p=0.28$), and Medicaid insurance ($p=0.26$) were not statistically significant between those with high CT utilization. Patients who had high CT utilization had similar rates of admission or operative intervention for acute abdominal pathology (15.1%) compared to those without (16.7%, $p=0.73$).

Conclusion: Recurrent abdominal pain is a frequent reason for ED presentation and includes high rates of comorbid conditions and CT utilization.

7. Reproducibility of Point of Care Tracheal Ultrasound to Predict Pediatric Endotracheal Tube Size

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Background and Objectives: Classically the formula $(age/4) + 4$ has been used to predict Endotracheal Tube (ETT) size in pediatric patients. However, literature does exist showing that this formula does not always correlate with retrospective reviews of CT scans performed in pediatric patients. Some studies, mostly from Asia, suggest that Point of Care Ultrasound (POCUS) can be an effective tool to predict what size ETT will be required. Our objective was to evaluate how reliably residents can obtain this measurement.

Methods: Children of emergency medicine faculty were recruited to undergo POCUS in the simulation lab. In the first session, residents performed POCUS on two training patients under the guidance of our lead ultrasound teaching faculty. In the following sessions, the process was reviewed but residents independently obtained measurements on a total of 7 further children. We evaluated the degree of agreement between the residents and the reference standard attending in whether the measured trachea would accommodate the ETT size predicted by the formula. No children were intubated.

Results: Three boys and four girls aged 2, 4, 5, 6, 8, 10, and 11 years old were recruited to participate. A total of 113 resident measurements were taken. The teaching attending predicted that one child could accommodate a larger tube than that predicted by the formula, 2 equaled the formula, and 2 each would require either a half-size smaller or full-size smaller tube than that predicted by the formula. In a total of 82 measurements, the residents agreed with the attending that the formula predicted tube would fit, in 22 there was disagreement, and in 9 both disagreed that the predicted tube would fit. The Kappa score for this level of agreement was 0.332, with a SE of 0.112 and 95% CI from 0.112 to 0.551, representing fair agreement. Twenty (91%) of 22 discrepancies between attending and residents involved only a 0.5 size difference in ETT. In 16/82 (20%) of cases with both agreeing that the formula predicted tube would fit, the resident-predicted tube was at least a full-size tube different than that predicted by the attending.

Conclusions: We found only fair agreement among residents with regard to whether a pediatric airway would be able to accommodate the formula-predicted ETT.

8. Comparative Analysis of Digital Camera Systems for the Documentation of Anogenital Injuries Following Sexual Assault

Hudock S, Rossman L, Solis S, Busman M, Ambrose L, Ouellette L, Jones JS

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Background and Objectives: Photo documentation is a standard of care and an essential skill for forensic clinicians responding to patients affected by violence and trauma. Colposcope images have been shown to have poor accuracy as well as limited interobserver agreement for the classification and location of anogenital injuries following sexual assault. This retrospective study compares the frequency and type of anogenital injuries detected by colposcope digital imaging to those injuries detected using a high-resolution camera system.

Methods: This was a retrospective, before-and-after trial to assess genital injuries in consecutive adult (>16 years old) women presenting after sexual assault to a freestanding nurse examiner clinic (NEC) during a 3-year study period. The clinic is staffed by forensic clinicians trained to perform medical-forensic examinations using colposcopy with nuclear staining and digital imaging. Patients evaluated in 2015-2016 had all injuries documented using a Cooper Surgical Leisegang® colposcope system; those seen in 2018 had injuries documented using only the high-resolution camera system. The primary outcome of interest was the frequency of genital findings documented in sexual assault victims from each group. Descriptive statistics were used to summarize the frequency of anogenital injury, location, and type of injury (abrasion, laceration, erythema, ecchymosis, and edema). Chi-square and ANOVA tests were used to compare the two study groups (standard colposcopy vs. high-resolution camera system).

Results: A total of 367 women were evaluated during the “before” period and 180 in the “after” period. The two groups were comparable in terms of demographics, alcohol use, assault history, time interval to examination, and the frequency of genital injuries (76.1% vs. 74.9%, $p=0.76$). Patients examined using the high-resolution camera system had a significantly greater number of mean genital injuries documented (2.4 vs. 1.8, $p<0.001$). The women in this group also had more anogenital abrasions identified (51.1% vs. 27.0%, $p<0.001$). The overall injury pattern was not statistically different; common sites of injury in both groups were posterior, including the fossa navicularis, fourchette, and labia minora.

Conclusions: Accurate photo documentation is a standard of forensic care. Our results suggest that the identification of anogenital injuries varies depending on the type of imaging system utilized.

9. Changing Medical Education: Firearm Violence Prevention Education in Pediatric and Emergency Medicine Residency Programs

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Background and Objectives: Physicians are uniquely positioned to provide firearm safety counseling (FSC), an effective injury prevention strategy, yet few practice FSC due to limited training and other barriers. Despite this, firearm violence prevention education (FVPE) is seldom taught in graduate medical education (GME). Our objectives were to provide FVPE to Pediatric and Emergency Medicine (EM) residents, characterize barriers to FSC, and assess the intervention's effect on physician confidence, comfort, and perceived barriers.

Methods: We recruited a cohort of EM and Pediatric residents from an urban academic medical center. The FVPE intervention was a pre-recorded lecture with a question-and-answer session. Pre and post surveys collected data on demographics, prior firearm experience, and FSC. Key outcomes were residents' comfort and confidence in, and barriers to, FSC during patient encounters which were collected as 11-point Likert scales (0= "not at all" to 10= "extremely"). Additionally, we collected data on participant demographics, prior firearm experience, and current FSC practices. Wilcoxon Signed-Rank test ($\alpha=0.05$) analyzed the effect of the FVPE course on key outcomes.

Results: Fifty-two residents completed the pre-survey, of which 20 completed the post-survey. 90% of residents reported interest in learning about FSC. As compared to Pediatric residents, EM residents had greater prior firearm experience including firearm use (70% vs. 46%), prior firearm safety education in GME (40% vs. 20%), and experience treating firearm injuries (73% vs. 40%). Comfort ($\Delta 3$ [10, 0.5], $p=0.003$) and confidence ($\Delta 5.5$ [-11.5, 0], $p=0.001$) both improved after the intervention for all participants, with EM residents showing greater improvement over Pediatric residents. Having "too little time" was the barrier most likely to prevent FSC for all residents. Pediatric residents were less likely to counsel due to "worry of damaging relationships" and the ability to "identify those at risk". These barriers were more likely to prevent Pediatric (med: 29, SD: 13) than EM residents (med: 16, SD: 14) from FSC.

Conclusion: Comfort and confidence in FSC improved in this cohort of EM and Pediatric residents after a brief educational intervention, regardless of prior firearm safety course completion. We found differences in perceived barriers to FSC between EM and pediatric residents. These findings describe the need for FVPE in graduate medical education and emphasize the usefulness of tailoring FSC curricula to the specific needs of different medical specialties.

10. Firearm Violence Prevention Education: Can Medical Students “Stop the Bleed?”

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Background and Objectives: Trauma is a leading cause of death in the United States, with approximately 49,000 firearm-related deaths in 2021. The Stop the Bleed (STB) campaign was created to increase survivability and train bystanders in external hemorrhage control. Medical schools are uniquely positioned to reframe firearm violence as a disease, incorporate firearm violence prevention and education (FVPE), and prepare students to engage in firearm safety counseling (FSC). Our primary outcome was to assess the effect of a combined STB-FVPE course on student confidence and willingness to engage in FSC. Secondary outcomes were participants' knowledge of firearm epidemiology and competency in external hemorrhage control.

Methods: A before-and-after mixed-methods study assessed the impact of an STB-FVPE course on pre-health and health professional student confidence and willingness to engage in FSC with pre- and post-course surveys. Additionally, we assessed knowledge of FVPE using a pre- and post-course assessment, and hemorrhage control competency with a video review of two standardized patient encounters. Data analysis included generalized estimating equation models for confidence and willingness to engage in FVPE and changes in competency in hemorrhage control. Rasch analysis assessed changes in pre- vs. post-course knowledge in FVPE. Demographics collected included education level and prior firearm safety course completion.

Results: There were 35 participants. Overall, confidence in FSC increased significantly after the STB-FVPE course ($\Delta 12.9$; 95% CI 9.91, 15.9). Participants without prior firearm safety course completion (PFSCC) had lower baseline confidence and demonstrated a greater improvement post-course ($\Delta 8.49$; 95% CI 3.32, 13.66). Willingness to engage in FSC did not significantly change after course completion. Additionally, there was no significant change in FVPE knowledge ($\Delta 0.16$ [-0.14, 0.45]). Non-medical students had lower pre-course FVPE knowledge compared to first-year medical students ($P=0.004$) and demonstrated a greater improvement in FVPE knowledge ($P<0.001$). Participants' "Treatment Plans" improved during a standardized patient encounter (OR 2.04; 95% CI 1.14, 3.64).

Conclusion: Firearm-related injuries and death continue to challenge the medical community. Our study demonstrated that a combined STB-FVPE course improved FSC confidence. The STB campaign provides public education and external hemorrhage control training that, if implemented into undergraduate medical education, can provide students with the tools to perform life-saving measures and engage in FSC.

11. I. C. A. R. E. – Refusal of Care

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Background and Objectives: Refusal calls comprise 5-20% of Emergency Medical Service (EMS) patient contacts. They are the most common source of litigation against EMS providers, with claims increasing over the last three decades. A patient's ability to refuse care relies on their capacity. A person with the capacity can learn, process, and make a rational decision based on the information provided to them. Capacity must be assessed in real-time, with the understanding that it can rapidly change. Currently, the State of Michigan Public Health Code, Act 368 of 1978, requires EMS providers to determine if a patient is capable when making an informed refusal of care. However, there are no laws describing how capacity is to be assessed. Many falsely perceive that if a patient is alert and oriented, they have capacity. Capacity can be defined as having four essential components. An understanding of the information being provided. An appreciation of this information. They must exhibit a reasoning process behind their decision. Finally, they must express their choice logically and linearly in a consistent manner over time. Several capacity assessment scales are widely used in the hospital. However, these tools can be very time-consuming, requiring 30 to 120 minutes to complete. To our knowledge, assessment tools have yet to be studied in the pre-hospital setting.

Methods: This project aims to develop a rapid and accurate capacity assessment tool and assess the impact of implementation. The iCare assessment tool was developed based on the four essential components of capacity. EMS providers will receive a 30-minute online education experience before implementation for standardization.

Results: Key metrics to be assessed include time on the scene, provider comfort level, quality of EMS documentation, and the rate of subsequent patient presentation to the Emergency Department following a refusal.

Conclusions: A standardized and accurate capacity assessment tool that can rapidly be applied in the pre-hospital setting may increase EMS provider comfort level, improve EMS documentation, and increase patient and EMS provider safety. The results of this project will be used to provide evidence of the utility of the iCare assessment tool.

12. Exploring the Clinical Significance and Diagnostic Value of Non-Specific ECG Findings in the Setting of Low High-Sensitivity Cardiac Troponin Levels

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Background and Objectives: *The utility of non-specific electrocardiogram (ECG) findings to modify risk for myocardial infarction (MI) in the context of low high-sensitivity cardiac troponin (hs-cTnI) is uncertain. Our objective was to assess the potential correlation between non-specific ischemic ECG (nsi-ECG) findings and the occurrence of major adverse cardiac events (MACE) within a 30-day timeframe among patients in the Emergency Department (ED) presenting with low levels of hs-cTnI.*

Methods: *We conducted a secondary analysis of the RACE-IT trial, a stepped-wedge cluster randomized trial performed across 9 EDs in a large metropolitan health system from July 2020 through March 2021 that looked at the safety and effectiveness of hs-cTnI in evaluating the risk for acute myocardial infarction (AMI). The trial examined a new 0/1-hour rapid protocol using hs-cTnI versus the standard of care, which used a 0/3-hour protocol without reporting hs-cTnI values below the 99th percentile. Our current study assessed the association between nsi-ECG findings (defined as left bundle branch block [LBBB], ST-segment changes (defined as ST-segment depressions or elevations less than 1 mm in two contiguous leads, or T-wave inversions [TWI]) and 30-day MACE (death, AMI, heart failure hospitalization, or coronary revascularization) in patients who had AMI ruled out based on low hs-cTnI levels. Patients presenting for evaluation of possible AMI were eligible if the treating clinician ordered an ECG and cardiac troponin and the patient was discharged with a low troponin level, defined as a hs-cTnI of <18.*

Results: *16,606 patients were ruled out for AMI with a hs-cTnI of <18 and were included in this analysis. The mean age was 53.4 years (SD 17.8), 9,820 (59.3%) were female, 6,786 (40.7%) were male, and 5,367 (32.3%) were African American. ECG findings were categorized as 2145 (12.9%) with ST-segment changes, 1317 (8.4%) with TWI, 956 (5.8%) with left ventricular hypertrophy, 487 (2.9%) with right bundle branch block, and 153 (0.9%) with LBBB. Combined, there were 3345 (20.1%) patients with abnormal, potentially ischemic ECG findings. Thirty-day death or AMI occurred in 66 (0.4%) patients. Death within 30 days occurred in 47 (0.3%) patients, of whom 38 (82.6%) were adjudicated as non-cardiac. AMI occurred in 19 (0.1%) patients, 16 of whom had Type II AMI. There was no difference in MACE events based on potentially ischemic findings (OR 1.38, 95% CI 0.79 - 2.39, p=0.257). The presence of ST-segment changes, however, had a trend towards greater odds of MACE (OR 2.53, 95% CI 0.92 - 6.99).*

Conclusion: *Non-specific ischemic ECG findings in the setting of low hs-cTnI are not associated with greater MACE events within 30 days of discharge for patients presenting with possible AMIs. The use of nsi-ECG findings should be considered in the context of hs-cTnI levels when evaluating risk for coronary disease.*

13. EMS and Public Health Personnel Perspectives on Prehospital Roles and Alternative Emergency Response Models

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Background and Objectives: *New approaches to emergency response are a national focus due to evolving needs and growing demands on the emergency response system. However, the perspectives of first responders have yet to be documented to incorporate into new models. Local urban public safety and public health leaders were tasked with developing alternative response models and methods to prevent and support recovery from community crises. This project aims to identify the perspectives of first responders regarding their evolving roles to inform the development and implementation of alternative 9-1-1 response models.*

Methods: *Leaders of three urban public health and service agencies sent an electronic survey to EMS clinicians and public health workers. Participants were queried about their perceived roles in responding to, preventing, and supporting a neighborhood's recovery after general, mental health, and violent emergencies. The survey also collected opinions about interdisciplinary partnerships and additional resources needed to further address prehospital emergencies.*

Results: *The survey was completed by 941 EMS clinicians and 58 public health workers contributing to a 50.1% response rate. Overall, 97% of EMS clinicians and 42% of public health workers agreed they have a role in immediate response to 9-1-1 emergencies. In mental health emergencies, 87% of EMS clinicians and 52% of public health workers agreed they have a role, compared to 87% and 30%, respectively, in violent emergencies. Regarding preventing emergencies, 74% of EMS clinicians and 84% of public health workers agreed they have a role, compared to 44% and 52%, respectively, in recovery after an emergency. In response to multidisciplinary emergency response models, 84% of respondents felt this was a necessary change. However, 35% of respondents felt their agency has the resources needed to make changes; additional resources needed included transportation options, collaboration with other professionals, and partners that operate continuously.*

Conclusions: *This project demonstrates the differences in perceived roles in emergency response between EMS clinicians and public health workers and beliefs about the types of emergencies that are within their scope. There is strong support among these frontline workers for alternative approaches but a need for additional resources to develop and implement them.*

14. Aural Search & Rescue: Techniques for Ear Foreign Body Removal in the Emergency Department

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Background and Objectives: Ear foreign bodies (EFB) are a common complaint in the emergency department (ED), especially among children. The aim of this community-based study was to describe our success rate with various techniques and devices for EFB removal in a large cohort of children and adults presenting to the ED in West Michigan.

Methods: This is a retrospective cohort analysis of patients presenting to the EDs of twelve affiliated hospitals in West Michigan with a diagnosis of EFB. Spanning 19 counties in Michigan, affiliated institutions included four rural medical centers, three community hospitals, four university-affiliated hospitals, and a children's tertiary care facility. All eligible cases were seen between December 2011 and December 2021 (120 months). Patient demographics, type of EFB, treatment in the ED, complications, and final disposition were recorded using a standardized abstract form. The main outcome criteria were the first attempt success rate of each technique. Descriptive statistics (mean, SD) and 95% confidence intervals (95% CI) were used to describe key demographic and outcome variables.

Results: During the study period, 1186 patients presented to the ED with a total of 1216 EFBs. The mean age was 24.4 years; 50.8% were children (< 13 years) and 10.7% were elderly (> 64 years). Sixty-five different types of EFBs were identified, typically located in the right ear (56.3%) for a mean duration of 19.0 hours. Overall, 47.5% of the EFBs were not visible without direct instrumentation. Fifteen different extraction techniques were documented during the study period. First-attempt success rates included the alligator forceps (89.2%), ear cures/loop (70.1%), irrigation (67.6%), hemostats (51.9%), suction catheters (33.0%), and Katz extractor (29.4%). Overall, 71.5% (95% CI, 68.8 to 74.0%) of EFB were removed on the first attempt; 5.3% (95% CI, 4.1 to 6.7%) on the second attempt; and 3.1% (95% CI, 2.2 to 4.3%) required three or more attempts. Complications occurred in 94 patients (7.9%) and included mild bleeding, abrasions, pain, and displacement of EFB. Sixty-nine patients (5.8%) required sedation for the procedure. A total of 248 (20.9%) were referred to otolaryngology. Risk factors that indicated difficult removal were young age, round objects, EFBs deep within the auditory canal (not visible without direct instrumentation), trauma during attempted removal, multiple removal attempts, button batteries, and objects in the ear canal for more than 24 hours.

Conclusion: Many simple removal techniques and devices are available for EFBs depending on the type of foreign body, location, age of the patient, and degree of obstruction. These methods are not time-consuming and do not require complex equipment. Risk factors that indicate difficult removal should be considered for referral to an otolaryngology specialist.

15. Barriers to an Ultrasound-First Approach to Renal Colic in the Emergency Department

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Background and Objectives: *There are conflicting opinions and evidence regarding the optimal imaging choice in patients with suspected renal colic. The role of point of care ultrasound (POCUS) imaging for diagnosing renal colic has been discussed and debated for many years. The aim of this survey was to investigate the degree of consensus between providers for their diagnostic approach; the comfort of emergency department (ED) providers in the use of ultrasound (POCUS or Radiology performed) and finally to identify perceived barriers to implementation of an ultrasound (US) first approach.*

Methods: *A retrospective study of adult patients presenting to the ED with renal colic who had diagnostic imaging. The study took place in 2021 in a single academic ED. Data collected included demographics, clinical features, and treatment outcomes. This chart review was followed by a prospective survey of ED clinicians. Each recipient was sent a link to the survey using a FORMS spreadsheet. The survey instrument included demographics, perceived barriers to US first approach, and nine clinical scenarios with a choice for the most appropriate 1st imaging modality (taken from a multi-disciplinary consensus article).*

Results: *A total of 377 patients presented to the ED with renal colic; 177 patients were excluded based on exclusion criteria and weight. Of these 177 patients, 110 (62%) had a final diagnosis of kidney stone. Overall, 54% (95/177) had a history of stones. Imaging modalities included: 19% had US, 75% had computed tomography (CT) scan without contrast and 5% had a CT with contrast. No serious alternative diagnoses were diagnosed by CT scan. Thirteen percent (23) were admitted to hospital; 16% (28) had required a urological intervention. Of the surveyed clinicians who responded (112/250) – 88% of providers either never or rarely use POCUS to investigate renal colic. Practice location included a broad distribution of both regional and academic centers. Overall, 59% of respondents perceived significant barriers to performing US first approach including inconsistent reimbursement, lack of a local multidisciplinary approach, time to perform US examinations, and lack of US training. Of the nine clinical scenarios, there was poor consensus from the clinicians surveyed regarding the first modality of choice for imaging.*

Conclusions: *Despite a national consensus recommending an US first approach to patients with renal colic, most ED patients continue to undergo CT imaging. The physician survey demonstrated a poor consensus regarding the modality choice for imaging in renal colic in the given clinical scenarios. This suggests there is a lack of understanding of where an ultrasound-first approach would fit in the diagnostic work-up. The physicians also highlighted large barriers to this approach, which included a lack of a multidisciplinary approach to imaging, limited training, and limited knowledge for performing and interpreting POCUS.*

16. Something for Pain: Managing “Simple Toothache” in Children Presenting to the Emergency Department

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Background and Objectives: *The incidence of antibiotic and opioid prescribing for pediatric patients presenting to emergency departments (ED) for dental pain without evidence of obvious infection is not well known. The purpose of this study is to examine ED prescribing patterns for the treatment of “simple toothache” in children.*

Methods: *This was a retrospective, cohort analysis of consecutive pediatric patients (ages 1-19 years) diagnosed with dental pain without obvious infection (defined as fever, intraoral or extraoral swelling, purulence, or trismus). Patients were seen at seven emergency departments (ED) over a 48-month study period (2018-2021). Spanning 13 counties in Michigan, affiliated institutions included three rural medical centers, three university-affiliated hospitals and a children’s tertiary care facility. Clinical findings, treatment in the ED, and final disposition were recorded using an institutional honest broker system. Our study hypothesis was that both antibiotics and opioids are prescribed too frequently for the ED treatment of simple toothache in children. Descriptive statistics (frequency tables, confidence intervals) were used to summarize the data.*

Results: *A total of 7114 ED patients presented with dental pain without obvious infection during the study period; 683 (9.6%) were pediatric patients. The average age was 11.6 ± 5.8 years. The 17- through 19-year age group had the highest rate of dental-related ED visits (33.1%). A higher proportion of Medicaid beneficiaries (66.6%) had dental visits compared with the commercially insured (26.9%) or uninsured (6.5%). Virtually all had a documented primary care physician (99.0%). The most common diagnoses were nonspecific odontalgia (55.4%) or dental caries (33.7%). An antibiotic, most often amoxicillin or penicillin, was prescribed in 60.7% (95% CI 57.0% to 64.4%) of ED visits. Opioids, most often hydrocodone, were prescribed in 18.7% (95% CI 15.9% to 21.9%). Dental nerve blocks were performed in 43 patients (6.3%). Twelve percent of patients returned within 7 days requesting further analgesia.*

Conclusion: *The ED is a well-known safety net for children with a simple toothache who have no direct access to dental care. However, the recommended treatment for these patients are usually dental procedures rather than antibiotics or narcotics. Data-driven solutions, such as guideline implementation, provider education, use of nonsteroidal anti-inflammatory drugs, and dental nerve blocks could reduce medication-related harms and avert health care expenditures.*

17. When Cannabis Use Goes Wrong: Characteristics and Outcomes in Patients Hospitalized with Acute Cannabis Toxicity

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Background and Objectives: Increased availability and use of cannabis in Michigan have led to a marked increase in emergency department (ED) visits associated with the drug's cardiopulmonary effects. Our purpose was to describe the prevalence, clinical features, and disposition of cannabis cardiopulmonary toxicity 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 eight emergency departments (EDs) over a 26-month study period (November 2018-December 2020). Affiliated institutions included three university-affiliated hospitals, a children's tertiary care facility, and four rural medical centers. Data collected included demographics, clinical features, and treatment outcomes in patients presenting to the ED with cardiopulmonary symptoms (CPS) versus those experiencing other forms of cannabis toxicity.

Results: During the study period, 1135 patients were evaluated for cannabis toxicity. A total of 312 patients (27.5%) had a cardiopulmonary chief complaint (CPS group) and 823 (72.5%) experienced other forms of cannabis toxicity, predominantly symptoms of intoxication, cannabis hyperemesis syndrome, or neuropsychiatric complaints. The CPS group presented with tachycardia (44.3%), chest tightness (34.9%), dyspnea (31.1%), palpitations (21.5%), and hypertension (18.9%). CPS patients were more likely to be older (34.0 vs. 24.3 years, $p<0.001$), have comorbidities (36.7 vs. 11.6%, $p<0.001$), and a history of polysubstance abuse (23.5 vs 9.9%, $p<0.001$). These patients also had a longer ED length of stay (6.0 vs. 2.8 hours, $p<0.001$) and significantly more hospital admissions (9.0% vs. 5.2%, $p<0.001$).

Conclusions: Cardiopulmonary toxicity is common after acute or chronic cannabis exposures, occurring in over one-quarter of ED patients in this community-based study. These troublesome findings highlight the risks associated with the use of cannabis for recreational or therapeutic purposes.

18. Evaluation of Prehospital Management of Pediatric Seizures

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Background and Objectives: Pediatric seizure is the 3rd most common pediatric chief complaint encountered by Emergency Medical Services (EMS) and previous studies show that the median time to administration of the first benzodiazepine is 28 minutes. Previous studies also reveal that earlier cessation of seizure is associated with better clinical outcomes. This retrospective study analyzes the treatment of pediatric seizures by West Michigan EMS agencies transporting patients to Helen DeVos Children's Hospital Emergency Department (HDVCH ED). Our objective was to analyze the demographics and details of benzodiazepine administration by EMS and its effects on clinical outcomes. Our secondary objective was to provide feedback to individual EMS agencies about identified areas for improvement.

Methods: Initial patient data was captured by querying three local EMS agency database sets for pediatric patients aged 0-17 years with chief complaint of seizure who were transported to HDVCH ED between January 1, 2019, and December 31, 2019. Matching hospital data was collected through an Epic electronic medical records query. Multiple variables were collected regarding the details of benzodiazepine administration by EMS and the clinical outcomes of each patient. A medication dose was considered accurate if within 20% of the recommended weight-based dose. Standard statistical analysis was performed to determine significant associations.

Results: In 2019, 348 patients were transported to HDVCH ED for a chief complaint of seizures. After ED evaluation, 46% of patients were diagnosed with seizure, 30.8% febrile seizure, 5.5% psychogenic associated illness and 17.8% other. 12.9% of patients received a dose of benzodiazepine by EMS. The median (p25-p75) time from EMS arrival to benzodiazepine administration was 8 (5-16) minutes and 72% (31/43) were given accurate doses. Of the 12 incorrect dosages, the largest errors were intravenous administrations compared to intramuscular administrations. Patients who received benzodiazepines by EMS were less likely to receive benzodiazepines in the ED (24.4% versus 75.6%) and require hospitalization (36.6% versus 63.4%).

Conclusion: EMS personnel in West Michigan performed well regarding the early administration of benzodiazepines for pediatric seizures compared to previous studies but could continue to improve in administering accurate weight-based medications. Proper dosing of intravenous formulations was identified to be a particular area for improvement.

19. Goals of Care Conversations during Prehospital Cardiac Arrest Resuscitation

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Background and Objectives: *Goals of care conversations are integral to ensuring healthcare providers deliver patient-focused care. Our institution hosts a three-year Emergency Medicine residency and a one-year Emergency Medical Services fellowship that includes prehospital experiences via a physician response vehicle. The on-duty physician(s) are dispatched to every out-of-hospital cardiac arrest (OHCA) in the county. When family is available, the physician can directly discuss, and electronically document, the patient's goals of care in real-time. This study aimed to measure the occurrence rate and content of goals of care conversations performed by our physicians at OHCA.*

Methods: *The documentation database was downloaded as a spreadsheet. Through a retrospective chart review, two authors abstracted data from cardiac arrest encounters dated 9/26/2022 - 4/14/2023. Narrative content was grouped by theme. Descriptive statistics were calculated.*

Results: *The physicians responded to 149 OHCA during the study period. A patient advocate was present 86.6% (129/149) of the time, with goals of care conversations occurring at 73.6% (95/129) arrests. This resulted in immediate cessation of resuscitation for 20% (19/95), with the remaining number split between continued full and limited resuscitative efforts. Goals of care conversations were deemed inappropriate to have at three scenes despite having a patient advocate present. Common discussion themes included neurologic outcomes, the need for mechanical ventilation, and critical care unit admission.*

Conclusion: *Goals of care conversations were held at a majority of OHCA, with a substantial number of these changing the course of resuscitation, including immediate termination of resuscitation. Succinct goals of care conversations during OHCA may result in more goal-concordant patient care and improved utilization of scarce resources.*

20. Public Perceptions about Cardiopulmonary Resuscitation in West Michigan

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Background and Objectives: *In emergency departments (EDs) throughout the nation, both patients and doctors grapple with the dilemma of choosing whether to proceed with cardiopulmonary resuscitation (CPR) and other medical interventions that could potentially prolong life. Frequently, these choices lack a solid foundation and might be influenced by information derived from television or other forms of public media. The objective of this research was to conduct a survey involving 800 adult volunteers, aiming to explore their television (TV) watching behaviors and their perceptions regarding CPR, specifically its probability of leading to survival. Our research hypothesis posited that the portrayal of CPR in the media causes the general audience to develop an unrealistic viewpoint about the effectiveness and success likelihood of CPR.*

Methods: *Prospective written surveys were distributed at two academic medical centers in West Michigan during 2023. The questionnaire was administered by trained researchers to a convenience sample of non-critically ill patients and/or their families during randomly selected shifts. A validated survey that was developed previously to assess layperson perceptions and expectations of survival from cardiac arrest was used in this study. Information requested by the survey included demographics, sources of information about CPR, TV viewing habits, and 4 anchoring vignettes. The vignettes asked respondents to estimate the chance of recovery (using visual analog scales) following cardiopulmonary arrest in elderly and pediatric patients, in-hospital and out-of-hospital scenarios. Bivariate Pearson's correlations were performed to assess the association between the number of correct answers to the vignettes with age and the frequency of media exposure.*

Results: *Among the 800 participants, the mean age was 38 years (range 18 to 86 years); 61% were female. Twenty-two percent had made provisions for a living will. Respondents watched an average of 19.7 +/- 10.3 hours of television/week. This included educational medical TV programs (59%) and TV fictional dramas (54%). Overall, 15% (120/800) felt TV dramas were a reliable source of health information. CPR training was cited most often as a primary source of information concerning CPR (53%), followed by television (41%), friends or family with medical training (18%), personal experience (15%), and the internet (14%). In the vignettes, participants consistently overestimated the success rate of CPR (66% predicted postcardiac survival) as well as long-term outcome (64.66% predicted a complete neurological recovery). Bivariate correlations analysis showed no significant correlation between the number of correct responses and age, television viewing patterns, or internet use.*

Conclusion: *Most people surveyed overestimated the chances of survival, as well as recovery following CPR. This places an extra burden on the emergency clinician as they must discuss decisions about the end of life with patients and families who will most likely be grossly misinformed about probable outcomes.*

21. The Impact of Transfers on Outcomes in Patients with Intracerebral Hemorrhage

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Background and Objectives: Spontaneous intracerebral hemorrhage (ICH) accounts for up to 10% of acute strokes and is associated with a high rate of morbidity and mortality with worse outcomes seen in those with hematoma expansion.¹ Hematoma expansion can be mitigated through interventions that lower blood pressure and blood pressure variability, leading to better functional outcomes. Rapid guideline-based care has the potential to improve outcomes. In this study, we aimed to assess how pre-hospital and inter-hospital transfers impact guideline-based care delivery. Our objective was to describe the current state of transfers, including rates of anticoagulant and antiplatelet use, hematoma expansion, and the need for blood pressure control.

Methods: This is an observational study using the Get with the Guidelines Stroke Registry. All patients with a primary diagnosis of ICH within the Henry Ford Health System from 2015 through 2023. We have excluded all patients who are under the age of 18 years. Registry data and data from each patient's electronic medical record (EMR) were used to record the time of first CT brain non-contrast and the ABC/2 Formula for Intracerebral Hemorrhage Volume was used to calculate ICH volume at that time. ICH volume was also calculated for CT brain imaging closest to 24 hours after the initial CT. Only intraparenchymal hemorrhage volume was recorded with the exclusion of any intraventricular bleeding. Additional patient data included daily anticoagulant medications and the first blood pressure recorded in the emergency department (ED). If anticoagulant reversal was necessary, the type of reversal agent was noted. If each patient's first systolic blood pressure was over 160 mmHg, the time of administration of antihypertensive therapy was recorded and a repeat blood pressure reading after initiation of the antihypertensive drug was also documented. The analysis consisted of regression models to assess site transfer effects on the presence of hematoma expansion while adjusting for age and illness severity.

Results: The study includes 81 patients who were transferred to Henry Ford Hospital in Detroit for management of ICH between July 2019 and May 2022. Sixty-two (77%) of these patients were taking either an anticoagulant or antiplatelet agent at the time of the ICH. Of the 81 patients with ICH, 32 (40%) had ICH volume expansion on the repeat CT. In patients with ICH volume expansion, the average volume of expansion was 17.49 mL. Twenty-six (81%) of the 32 patients with ICH volume expansion were taking either an antiplatelet or anticoagulant agent. Of the 32 patients with ICH expansion, 15 (47%) had a systolic blood pressure greater than 160 mmHg on initial arrival to the Emergency Department.

Conclusion: Data on ICH transfer to a comprehensive stroke center reveals important hazards including high rates of hematoma expansion, the need for blood pressure control, and the potential need for reversal of coagulopathy. We aim to use this data to determine critical areas for quality improvement to optimize guideline-based care during the transfer process.

22. Outcomes in Emergency Department Patients Diagnosed with Pyelonephritis and Discharged on Non-traditional Antibiotic Regimens

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Background and Objectives: *Guidelines for treating pyelonephritis have not been recently updated. In our center, the antibiogram shows that E. coli is typically susceptible to cefalexin. In light of antimicrobial stewardship, our goal was to identify if patients treated with cefalexin had a higher rate of treatment failure than patients treated with traditional antibiotics.*

Methods: *Data was collected using a retrospective chart review of all patients > 18 years old discharged from the ED with a diagnosis of pyelonephritis from November 2020 to October 2022. SQL server query of our Epic electronic health record identified patients discharged with pyelonephritis and extracted their age, sex, race, discharge prescriptions, ED disposition, 30-day return or death into a spreadsheet. Urine white blood cell count per high power field (WBC/hpf), and presence of flank pain, vomiting, or CVA tenderness were manually extracted. Patients were classified into two groups, those receiving traditional antibiotics for pyelonephritis, and those receiving nontraditional antibiotics. The primary outcome was a 30-day return to the emergency department requiring admission to the hospital. Two-tailed t-tests were used to analyze differences in baseline data and Fischer exact test was used to evaluate the primary outcome.*

Results: *We identified 80 patients discharged with the clinical diagnosis of pyelonephritis. Twenty-five patients were treated with traditional antibiotics including third-generation cephalosporins, fluoroquinolones, amoxicillin-clavulanic acid, or trimethoprim-sulbactam. Fifty-five patients were treated with nontraditional antibiotics, with 54 treated with cefalexin and 1 treated with nitrofurantoin. Traditionally treated patients averaged 1.9 historical elements (vomiting, flank pain, CVA tenderness) versus 1.8 in the non-traditional group ($p=.62$, CI -0.33 – 0.54). Similarly, traditionally treated patients had a mean of 65 WBC/hpf versus 64 WBC/hpf in the non-traditional group ($p=.84$, CI -17 – 20). Of patients treated with traditional antibiotics, 6 (24%) patients presented to the emergency department within 30 days, and none required admission. Of patients treated with nontraditional antibiotics, 15 (27%) patients presented to the emergency department within 30 days, one of whom was admitted. Fisher exact test statistic was 1, not statistically significant. There were no deaths.*

Conclusions: *In a geographic region where E. coli appears susceptible to cefalexin, treatment with cefalexin does not appear to increase admission rates in patients diagnosed with pyelonephritis discharged from the emergency department.*

23. Outpatient Treatment of Pulmonary Embolism Is Associated With Decreased Length of Stay and Cost to Patient and No Increase in Readmission

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Background and Objectives: *The treatment of pulmonary embolism (PE) historically requires a hospital admission on parenteral anticoagulation with a hospital length of stay (LOS) ranging from two to ten days. Recent evidence suggests low risk PE may be suitable for outpatient treatment of pulmonary embolism (OTPE) on a direct oral anticoagulant (DOAC). Discharge directly from the emergency department (ED) is described to confer average cost savings of \$5000-\$11500 per patient₁. The objective of this study is to assess outcome and cost differences amongst this low-risk PE population.*

Methods: *This is an actively enrolling prospective observational study from July 2020 to January 2023 performed at a single site. All PE patients, if risk-stratified as low-risk (via the simplified Pulmonary Embolism Scoring Index and European Society of Cardiology), are evaluated for OTPE-eligibility. Data analysis compared OTPE-eligible patients admitted vs OTPE-eligible patients discharged. Variables assessed include age, sex, race, ethnicity, ED length of stay (LOS), hospital LOS, total charges, readmission, transfusion, and death. Patients discharged from the ED are identified as OTPE, and patients admitted to the hospital are identified as IP (inpatient).*

Results: *One hundred low-risk PE patients were identified. After 21 exclusions, there were 79 OTPE-eligible. 54 in the IP group and 25 OTPE. Patients are deemed OTPE-ineligible and excluded if COVID positive, recent major surgery, age less than 18 years old, history of major bleeding, history of heparin induced thrombocytopenia, previously diagnosed active thromboembolism with failed outpatient treatment, unable to follow-up outpatient or other medical or social reason for admission. Age, sex, and ethnicity were similar between both groups. Race was statistically significant ($p=0.021$) with Caucasian patients more likely to be admitted and Black patients more likely to be discharged. Total hospital LOS was statistically significant between IP and OTPE patients, 3.51 vs 0.23 days respectively ($p<0.001$). Rate of readmission and transfusion were similar, and only one death occurred in the IP group associated with major gastrointestinal bleed. Lastly, there was a statistically significant decrease between total hospital charges for OTPE vs IP patients ($p < 0.001$).*

Conclusions: *OTPE is associated with reduced hospital LOS, ED LOS and total hospital charges when compared to IP.*

24. Lymphoma Detection by Point of Care Ultrasound

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Background and Objectives: *Lymphoma is a neoplastic proliferation of lymphoid cells typically found in the lymph nodes, spleen, thymus, or bone marrow that organize into a discrete mass that can be classified pathologically as either Hodgkin or non-Hodgkin type. The clinical presentation of lymphoma can mimic that of several acute pathologic conditions such as soft tissue infections, lymphadenitis, or non-specific abdominal pain. Due to patient non-specific presentations, clinicians may leverage point-of-care ultrasound (POCUS) to narrow their differential diagnosis. There have been several cases in our emergency departments in which physicians used POCUS to differentiate such cases, ultimately leading to an expedited oncologic consult and diagnosis of lymphoma. Many times, patients have multiple visits to their physician or emergency department (ED) before the diagnosis is discovered. The purpose of this case series is to raise awareness for how POCUS might facilitate an earlier recognition of lymphoma. We present 6 lymphoma cases detected by POCUS in the ED. Greater familiarity with the presentation, common anatomic locations, and sonographic signatures of lymphoma might provide an earlier recognition for patients with this illness.*

Methods: *This multi-center retrospective case series was approved by the institutional review board of Corewell Health (Study ID: 2020-494). A patient list was generated by searching the QPath (Telex Healthcare, British Columbia, Canada) archives of POCUS images acquired in all Emergency Departments within the Corewell Health hospital network in Western Michigan between 2015 and 2020. A standardized data abstraction tool guided data collection in a coded, systematic way. Two independent reviewers read patient data to determine whether a case was suitable for inclusion. All imaging and follow-up visits were reviewed to provide a holistic understanding of how POCUS affected the patient's case.*

Results: (1): 17-year-old well-appearing female presented with left axillary discomfort for 2 weeks. The physician sought to evaluate for an axillary abscess with POCUS, finding 2 prominent 2x3cm hypoechoic masses. A subsequent complete blood showed lymphocytosis and thrombocytopenia. A same-day biopsy showed T-cell lymphoblastic lymphoma/leukemia. (2): A 46-year-old male presented with epigastric pain radiating posteriorly. POCUS was used to evaluate the upper peritoneal structures, where a 5x5x7cm splenic mass was seen. An urgent biopsy showed diffuse large B-cell lymphoma and the patient began oncological treatment immediately. (3): A 55-year-old male with a history of follicular non-Hodgkin lymphoma 11 years prior presented with dyspnea and bloating for several months that was acutely worse for 1 week. His lab results showed pancytopenia and POCUS showed splenomegaly. (4): A 44-year-old male athlete presented to the ED with a 3-week history of bilateral testicular pain. The physician wanted to examine for torsion or injury, so a POCUS was performed, which showed bilateral 2.5-3cm smooth hypoechoic circular testicular masses. Radical orchiectomy was promptly performed, showing EBV+ mature T-cell lymphoma with extranodal involvement. (5): A 26-year-old female presented with 8 months of neck swelling, with 2 days of acute pain. The physician performed a POCUS of the neck, finding multiple large >2cm lymph nodes in the anterior and posterior cervical chains. The patient was diagnosed with nodular sclerosing Hodgkin lymphoma. (6): A 46-year-old female presented with a painful right groin mass for 6 months and was initially instructed by her doctor to "watch and wait." The week prior to visiting the ED, she was prescribed Augmentin but did not improve. At the ED, she endorsed night sweats, weight loss, and pain with lifting. POCUS showed a 3cm enlarged lymph node. Subsequent surgical resection revealed EBV+ marginal zone lymphoma.

Conclusions: *Each of these cases highlights a different demographic and anatomical location that can be invaded by lymphoma. The patient presentation can be non-specific and lead physicians to consider more common etiologies. However, these cases illustrate how POCUS revealed sonographic clues to the underlying condition that was initially ambiguous. This series likewise shows examples of how POCUS was integral in the clinical decision-making process for differentiating soft tissue and abdominal complaints in the ED. It is prudent for the POCUS-performing clinician to understand the sequelae of symptoms that accompany the new onset of lymphoma. Although lymphomas have a wide variety of sonographic imaging appearances, developing familiarity with common presentations, imaging characteristics, and anatomic locations may assist clinicians performing POCUS to provide an earlier referral for patients.*

25. Full Dose Challenge of Moderate, Severe, and Unknown Beta-Lactam Allergies in the Emergency Department

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Background and Objectives: *This study aims to assess the outcome of challenging documented moderate, severe, or unknown beta-lactam allergies with full-dose administration of a beta-lactam antibiotic in Emergency Department (ED) patients admitted for acute bacterial infection.*

Methods: *A single-center, retrospective, descriptive study of adult patients challenged with full-dose beta-lactam in the ED from January 2021 to December 2022 was conducted. Included patients had at least one documented moderate, severe, or unknown beta-lactam allergy in the electronic medical record without documentation of prior tolerance. Patient demographics, prior beta-lactam antibiotic reaction, beta-lactam administered in the ED, inpatient beta-lactam continuation, adverse drug reactions, and updates to allergy profiles were collected. Descriptive statistics for data analysis were performed using SPSS version 22.*

Results: *Of the 184 ED encounters with full dose beta-lactam challenges, 5 (2.7%) of the patients with documented moderate, severe, or unknown beta-lactam allergies experienced an allergic reaction after the challenge; 1 (0.5%) patient had an allergic reaction in the ED, the remaining 4 (2.2%) occurred after admission. No anaphylactic reactions occurred. All allergic reactions were limited to mild rash or itching. Most patients (98.9%) were challenged with a cephalosporin. The beta-lactam administered in the ED was continued in 86.4% of cases, and the allergy profile was updated for future utilization in 73.4% of patients.*

Conclusions: *This study suggests that full dose challenge of moderate, severe, or unknown beta-lactam allergies can be safely accomplished in the ED. This approach avoids unnecessary penicillin allergy skin testing and reduces utilization of suboptimal alternative antibiotic regimens.*

26. Combat Medical Readiness: The Rush University Medical Center Advanced Trauma Training Program

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Background and Objectives: *Combat medical training is essential for U.S. Military Medical Service Members from both the Active and Reserve Components as it increases combat casualty survival while decreasing morbidity. Rush University Medical Center (RUMC) provides U.S. National Guard Service Members the Advanced Trauma Training Program (ATTP), a one-week training centered on trauma-care delivery, procedural competency, and military resiliency combating post-traumatic stress disorder (PTSD). The primary outcome of this work was characterizing course graduate feedback and identifying self-reported beliefs of medical readiness.*

Methods: *ATTP graduates from 2010-2022 electronically completed a self-administered, anonymous survey. Specific feedback was obtained on the program's content, instructor impact, and level of combat medical preparedness. Permission was obtained from all participants to use survey data for research purposes.*

Results: *Over the program's ten-year history, RUMC has trained 876 U.S. National Guard Members with 61.1% being male. The prominent medical backgrounds are EMT-B (40.1%) followed by RN (27.3%), PA (19.6%), and MD/DO (6.9%). Among course graduates, 49.2% had never been deployed and of those previously deployed, 95.6% rated ATTP as important to their combat medical experience. The average number of deployments per class was 9.75. In terms of deployment preparation, students rated the course as important to both personal (93.2%) and unit (97.0%) preparedness with a 98.5% likelihood to recommend. Students remarked the live-tissue and cadaver lab as extremely important (84.4%) while noting a post-deployment PTSD lecture as important (95.9%).*

Conclusions: *The Rush University Medical Center Advanced Trauma Training Program began as a targeted intervention to medically prepare U.S. Military Medical Service Members. These results suggest graduates believe this training is positively impacting their combat medical readiness and resilience. Further investigation with course graduates that were subsequently deployed to combat is imperative and ongoing.*

27. Preparing All Levels of Training for Combat Medical Readiness: RUSH Advanced Trauma Training Program

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Background and Objectives: Rush University Medical Center (RUMC) Department of Emergency Medicine provides the Advanced Trauma Training Program (ATTP), a comprehensive trauma training curriculum centered on trauma-care delivery, procedural competency, and military resiliency combating post-traumatic stress disorder (PTSD), to U.S. Armed Forces Medical Personnel. Members of servicemen and women enter the program with varying medical backgrounds such as EMT-Bs, EMT-Ps, RNs, PAs, and MD/DOs. The primary outcome of this work was characterizing course feedback from graduates through the lens of the level of previous medical training.

Methods: ATTP graduates from 2010-2022 electronically completed a self-administered, anonymous, on-line survey. Course graduates' medical backgrounds were noted, and specific feedback was obtained on the program's content, instructor impact, and level of combat medical preparedness.

Results: Over the program's ten-year history, RUMC has trained 876 U.S. Armed Forces Medical Personnel with 61.1% being male. Among participants, previous backgrounds included EMT-B (40.1%) followed by RN (27.3%), PA (19.6%), and MD/DO (6.9%). Among course graduates, 49.2% had never been deployed and of those previously deployed, 95.6% rated ATTP as important to their combat medical experience. Of class participants, 3.6 students per class had taken ATTP previously. In particular, the Live-Tissue and Cadaver lab were ranked by 99.1% of participants as important, with 84.4% ranking it as extremely important. Similarly, the Post-Deployment TBI Lecture was ranked by 95.9% as important.

Conclusions: The Rush University Medical Center Advanced Trauma Training Program began as a targeted intervention to medically prepare U.S. Armed Forces Medical Personnel. These results suggest that despite the diverse array of backgrounds in graduates, many found similar courses such as the human-based procedure lab and post-deployment TBI lecture particularly important in their education. Further investigation with course graduates that were subsequently deployed to combat is imperative and ongoing, and a stratified further analysis of level of medical training and course satisfaction will be imperative.

28. RUSH Advanced Trauma Training Program: Aggregate Course Deployments and Impact on Military Medical Readiness

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Background and Objectives: *Combat medical training is essential for U.S. Military Medical Service Members as it increases combat casualty survival while decreasing morbidity. Rush University Medical Center (RUMC) provides U.S. Armed Forces Medical Members the Advanced Trauma Training Program (ATTP), a comprehensive trauma training curriculum centered on trauma-care delivery, procedural competency, and military resilience. The primary objective was to characterize course graduate feedback and identify self-reported belief of medical readiness and competencies.*

Methods: *ATTP graduates from 2010-2022 electronically completed an anonymous survey. Feedback was obtained on the program's content and level of combat medical preparedness.*

Result: *Over the program's history, RUMC has trained over 5,000 Armed Forces Medical Personnel with this review highlighting 876 U.S. National Guard Members. Courses were aggregated into two separate groups based on the mean number of deployments per course per month: group A (2013, 2019, 2020, 2022, 60-80% of ≥ 1 deployment) and group B (2014-2018, 2021, 40-60% classes had ≥ 1 deployment). The average number of deployments per class was 9.75 (49.2% of total graduates never deployed). In terms of group A, 90.6% rated the course as very/extremely important, while 98.6% would recommend ATTP prior to deployment. In group B, these numbers were 90.1% and 98.4%, respectively. With regard to preparation for deployment, 84.3% (group A) and 87.4% (group B) valued the course as at least an 8/10 overall. In terms of hands-on skills, 90.6% of both groups viewed trauma skills as very/extremely important. Discussion on traumatic brain injury was viewed as very/extremely useful by 79.5% of group A and 89.6% of group B.*

Conclusion: *The Rush University Medical Center Advanced Trauma Training Program began as a targeted intervention to medically prepare U.S. Armed Forces Medical Personnel. Our preliminary results suggest prior deployment does not impact the likelihood to recommend the course, trauma skills training, preparation to deploy, and overall course rating. However, prior deployment was correlated with lower satisfaction with TBI discussion. Further investigation with course graduates who were subsequently deployed to combat is imperative and ongoing.*

29. Crash Cart Safety: Powering the AED and Process Improvement

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Background and Objectives: *One of the key factors to running a successful 'Code Blue' in the hospital setting is the availability of a properly stocked crash cart. Most carts are checked at least once per day by staff who follow a checklist. After a code, the actions of the staff, the presentation of the patient and the outcome of the resuscitation are often debriefed for future improvement. Otherwise, the cart sits unused. This leaves a large gap where the crash is not properly kept up to date, potentially harming patient safety.*

Methods: *Following a cardiac arrest in the surgery suite of a community access hospital in a large metropolitan area, a multidisciplinary team was assembled to conduct a root cause analysis. Administrative support was obtained for this project. Input from key stakeholders in the process (Emergency Medicine, ICU, Pharmacy, Central Supply) was solicited. A group of 4-5 members rebuilt a 'new' cart as an example for evaluation by stakeholders and administration. Approval was obtained from everyone. The new cart was placed into service to coincide with an upcoming Pharmacy and Central Supply scheduled change. New laminated quick reference cards were developed by the PR department for placement on the new cart. Modifications to code response by some departments were also made.*

Results: *Local estimates placed the last update to the crash carts approximately 15 years ago. A new adult crash cart that is stocked with currently endorsed equipment and that can support accepted AHA guidelines was created and placed throughout the hospital. Changes to Code Blue response were made to support the new carts as well.*

Conclusion: *Crash carts are a vital part of any emergent response in the hospital setting. Daily checks are important to the day-to-day function of the carts. However, there needs to be a periodic evaluation of the cart, its contents, and associated equipment. An overall evaluation of the cart needs to be done to keep up with current technology and guidelines but not so often as to be a burden on the hospital. A clear determination of who is responsible for this process needs to be established, but it may vary depending on institutional design so that patients in need of resuscitation receive the best possible care.*

30. Neuropsychiatric Effects of Cannabis Toxicity in the Emergency Department: A Community-based Study

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Background and Objectives: *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 ED visits associated with all forms of the drug. Our purpose was to describe the prevalence, clinical features, and disposition of cannabis neuropsychiatric toxicity in a community-based study.*

Methods: *Retrospective cohort analysis of consecutive patients diagnosed with any toxicity related to cannabis use. Patients were seen at seven emergency departments (EDs) spanning 13 counties in Michigan during November 2018 - October 2020 (24-months). Abstractors were medical students and residents with training in research methodology. They were blinded to the study objectives and used a structured abstract to collect data including demographics, clinical features, and treatment outcomes. Patients presenting to the ED with neuropsychiatric symptoms (NPS) were then compared to those experiencing other forms of cannabis toxicity. Chi-squared and t-tests were used to compare these two groups across key demographic and outcome variables. Interrater reliability of the data abstraction was assessed using Kappa statistic.*

Results: *During the study period, 1135 patients were evaluated for cannabis toxicity. The frequency of visits attributable to inhaled (82.9%) and edible cannabis (17.1%) increased throughout the study period. The overall mean age was 27.6 ± 9.1 years (range 6 mos-84); 90 (7.9%) were > 64 years and 32 (2.8%) were children < 12 years of age. A total of 452 patients (39.8%) had neuropsychiatric chief complaints (NPS group). Symptoms were typically severe anxiety, altered mental status, suicidal ideation, hallucinations, and depression. When compared to ED patients experiencing other forms of cannabis toxicity ($n = 683$), NPS patients were younger, female, Caucasian, more likely to use edible cannabis and had more comorbidities and a recent history of polysubstance abuse. Almost one-third of these NPS patients are admitted to the hospital, transferred to a psychiatric facility, or confined in jail.*

Conclusions: *Neuropsychiatric toxicity is common after acute or chronic cannabis exposures, occurring in 40% of ED patients in this community-based study. These patients are difficult to evaluate in the ED setting because of extreme ages, altered mental status, comorbidities, polysubstance abuse, frequent associated cardiopulmonary complaints and behavioral problems.*

31. Emergency Department and Hospital Utilization after Emergency Department-Initiated Buprenorphine for Opioid Use Disorder

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Background and Objectives: *The opioid crisis in the United States is a public health emergency. Emergency department (ED)-initiated buprenorphine with referral to ongoing care is an effective method to treat patients with opioid use disorder (OUD). While ED-initiated buprenorphine has been shown to be cost-effective, there is a paucity of data examining ED and hospital utilization after ED-initiated buprenorphine with referral to ongoing care. Our objective was to quantify ED and hospital utilization before and after ED-initiation of buprenorphine and referral to ongoing care. We hypothesized that patients would use the ED and be hospitalized at a lower rate after receiving ED-initiated buprenorphine and referral to ongoing care.*

Methods: *We performed a retrospective chart review using health information exchange data of patients who were treated in our ED with buprenorphine beginning March 1st, 2020 through December 31st, 2021. Patients were included if there was documentation of referral to ongoing care after receiving ED-initiated buprenorphine. Patients were excluded if they received a home dose medication or were not referred to ongoing care. We quantified the number of ED visits and medical hospitalizations in the 1 year before and after the initial ED-initiated buprenorphine treatment visit. Analysis includes descriptive statistics and McNemar's test to compare the proportion of patients pre- or post-ED-initiated buprenorphine that had ≥ 1 ED visit.*

Results: *We identified 129 patients that were treated with ED-initiated buprenorphine and met the inclusion criteria. Total ED visits were reduced or zero in 76 (58.9%) of the patients after ED-initiated buprenorphine. Total hospitalizations were reduced or zero in 97 (75.2%) of the patients after ED-initiated buprenorphine. The odds ratio (OR) estimates of a patient having ≥ 1 ED visits following ED-initiated buprenorphine was lower (OR 0.57, 95% CI 0.26 – 1.16), though this did not meet statistical significance ($p=0.096$). Similarly, the odds of a patient having ≥ 1 admission was lower (OR 0.70, 95% CI 0.34 – 1.38) but did not meet statistical significance ($p=0.262$).*

Conclusion: *In this retrospective chart review, the majority our patients visited the ED less and were admitted to hospital less after ED-initiated buprenorphine and referral to ongoing care. At this point in data collection, the study is underpowered to determine a significant difference. Further study is needed to quantify healthcare resource utilization after intervention with ED-initiated buprenorphine.*

32. Up in Smoke: Assessing the Quality of YouTube Videos on Cannabinoid Hyperemesis Syndrome

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Introduction: *The most common adverse effect from marijuana is the cannabinoid hyperemesis syndrome (CHS). Video-sharing platforms are a popular means of communication that reaches a wide audience. However, there is limited information available on recognizing and treating CHS in these videos. The aim of this study is to assess the quality and educational value of YouTube videos addressing CHS.*

Methods: *This was a retrospective content analysis of videos using YouTube's search engine to identify videos relating to cannabis hyperemesis syndrome over a 6-month study period. A standardized data abstraction form was used to collect qualitative and quantitative variables, including the number of views, sponsor (or reference), and the accuracy of the information provided. The medical claims made by the videos will be classified as substantiated or unsubstantiated using opinions of two board-certified toxicologists at MSU. The major study endpoint will be the total number of videos that clearly and accurately describe CHS, including risks and complications. We will also identify and describe the number of videos that include incorrect or misleading information.*

Results: *During the study period, a total of 100 YouTube videos cannabis hyperemesis syndrome met the inclusion criteria. The mean video length was 7.8 ± 4.1 minutes (range, 1 to 17.3 minutes). Overall, 35% of the videos were classified as useful; 46% were not useful; and 19% were misleading. Misleading claims were that CHS is a myth, it is only caused by contaminated cannabis, hot showers cure CHS, CHS is rare, only heavy users get CHS, any vomiting with cannabis use is CHS, and that there is a medicine to cure CHS. All the videos were found to be lacking important information, involving diagnosis, treatment, prevention, complications, and when to seek medical care.*

Conclusions: *Social media videos about Cannabis Hyperemesis Syndrome can be valuable tools for education, awareness, and support. However, viewers should approach them with a critical eye, verify information from reputable sources, and consult healthcare professionals for any medical concerns. Balanced and evidence-based content is essential to ensure that these videos serve their intended purpose of educating and supporting individuals affected by CHS.*

33. Screening for Sexually Transmitted Infections in Adolescents with Genitourinary Complaints: Is There a Still Role for Endocervical Gram Stains?

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Background and Objectives: Adolescent females are disproportionately affected by sexually transmitted infections (STIs). Endocervical Gram stain smears taken during gynecological examination are inexpensive, relatively easy procedure to perform and interpret. The purpose of this study was to evaluate the performance characteristics of Gram smears in the diagnosis of Chlamydia trachomatis (CT), Neisseria gonorrhoeae (GC) and Trichomonas vaginalis (TV) in a female adolescent population presenting to the Emergency Department with genitourinary complaints.

Methods: This study was a retrospective, cohort analysis of consecutive females (ages 13 – 19) seen at three academic medical centers over a two-year study period. All patients underwent a pelvic exam with diagnostic testing for STIs. Positive criteria for a Gram stain included greater than ten white blood cells per high-power field, gram-negative intracellular/extracellular diplococci (suggesting GC), or direct visualization of TV organisms. Polymerase chain reaction (PCR) assays were used as the gold standard definition for CT/GC infection. Direct microscopic visualization of organisms on a separate wet mount prep was considered the gold standard for TV infection. Demographic information, clinical findings of cervicitis, and the results of diagnostic testing were obtained from ED records using standardized abstraction forms. A second investigator performed a blinded critical review of a random sample of 10% of the programs to determine reliability using kappa statistics. Values of sensitivity, specificity and likelihood ratio (LR) were obtained, using 95% confidence intervals (CIs) for quantifying uncertainty.

Results: During the study period, 1303 adolescent females were evaluated for genitourinary complaints. A total of 188 adolescents (14.4%) had at least one documented STI. Overall, 298 patients (22.9%) had positive gram stains. The sensitivity, specificity and positive likelihood ratio for Gram stain in the diagnosis of STI were 28.7% (95% CI, 22.0 to 36.2), 78.2% (95% CI, 75.6 to 80.5) and 1.3 (95% CI 1.0 to 1.7), respectively. The sensitivity of Gram stain to Chlamydia trachomatis, Neisseria gonorrhoeae, and Trichomonas vaginalis were 35.9% (95% CI 26.8 to 45.8), 34.5% (95% CI 18.0 to 54.3), and 5.7% (95% CI 1.3 to 15.7), respectively. The consistency of the data recording was excellent, with a median kappa statistic of 0.89.

Conclusions: The positive likelihood ratio of inflammation on endocervical Gram stain is too low to recommend its use to direct empiric treatment adolescents at risk for sexually transmitted infections. Diagnostic uncertainty or treatment failures should prompt specific laboratory testing.

34. Trampoline Safety in Children and Adolescents: An Analysis of YouTube Videos

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Background and Objectives: Trampoline injuries in the United States are a significant concern, particularly among children and adolescents. These injuries often result from recreational trampoline use in backyards and indoor trampoline parks. Due to its popularity and frequent usage, social media may help in disseminating evidence-based information regarding trampoline safety as well as recommendations by healthcare authorities. However, there is little available evidence regarding the accuracy and reliability of this online information. In this study, we aim to assess the utility of social media in providing useful, factual, and timely information regarding trampoline safety in children and adolescents.

Methods: This was a retrospective content analysis of videos available through YouTube using specific search terms relating to "trampoline" and "safety" or "precautions". Videos without sound, duplicate content, news reports, non-English, or directed solely at adults or athletes were excluded. A standardized data abstraction form was used to collect qualitative and quantitative variables, including the number of views, sponsor (or reference), and the accuracy of the information provided. The safety suggestions (tips, precautions) made by the videos were classified as substantiated or unsubstantiated using opinions of board-certified pediatric emergency physicians as well as policy statements published by the American Academy of Pediatrics. Search results were grouped into three categories: "Useful", "Not Useful", and "Misleading". The "Useful" category included evidence-based and/or informative results on trampoline safety. The "Misleading" category consisted of videos that gave false, inaccurate, or misleading information.

Results: During the study period (August 2023), a total of 63 YouTube videos relating to trampoline safety met the inclusion criteria. The mean video length was 3.5 ± 2.3 minutes (range, 30 sec to 13.1 minutes). The videos were collectively viewed 1,078,119 times with an average of 17,113 views per video. Educational material was demonstrated by a live individual in 65.2% of the videos, animation in 29.4% and photographs in 5.0%. Overall, 39.7% of the videos were classified as useful; 38.1% were not useful; and 22.2% were misleading. All were found to be lacking important safety information, including recommendations on trampoline equipment, appropriate installation or maintenance, the need for adult supervision, adequate safety precautions, dangerous hazards, and when to seek medical care.

Conclusions: Social media can be a double-edged sword when it comes to trampoline safety in children. While it has the potential to educate and raise awareness about safety measures, its limitations include the spread of misinformation, lack of expert guidance, ignoring many safety precautions, conflicting information and underestimating injury risks. This study highlights the need for high-quality, evidence-based videos to help parents educate their children about trampoline safety, supervise their trampoline use, and ensure they follow recommended safety guidelines.

35. Assessing Ergonomics at Computer Workstations in the Emergency Department

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Study Objectives: *The increased use of computers at home and at work has resulted in a similar increase in the number of musculoskeletal disorders reported. These disorders involve recurrent and persistent pain, may involve disability in any body part, and may happen progressively over periods of weeks to years. The goal of this pilot study was to assess the prevalence of ergonomic risk factors in emergency department (ED) clinicians at computer workstations.*

Methods: *This was a prospective, blinded, clinical assessment analysis conducted over a 2-month study period. Emergency department clinicians (physicians, residents, and advanced practice providers) from a children's tertiary care facility and a university-affiliated hospital were observed during routine computer tasks (such as dictation, placing orders, or reviewing digital records). None of these clinicians were aware of the purpose of the study. Trained observers completed a Rapid Office Strain Assessment (ROSA) checklist to evaluate computer use ergonomic risk factors. ROSA final scores ranged in magnitude from 1 to 10, with each successive score representing an increased presence of risk factors. A ROSA score of 5 is considered an action level indicating when immediate change is necessary. one-way analysis of variance tests were used to compare ergonomic assessments at each level of postgraduate training*

Results: *Sixty-six ED providers were observed performing a total of 72 tasks on computers. Providers were residents (42.4%), faculty (30.3%) and advanced practice providers (27.3%). Computer tasks included dictation, placing orders, or reviewing digital records. The mean ROSA score for all providers was 3.3 (SD 1.0). Overall, 24.2% of clinicians were scored at high risk for musculoskeletal disorders (ROSA score was >4). A ROSA score of 5 is considered an action level indicating when immediate change is necessary. ROSA scores did not differ significantly among the various levels of postgraduate training. Computer use risk factors included awkward postures of the wrist and forearm, improper sitting posture, height of chair and workstation, lack of lumbar support, repetitive motions, and contact pressures in the wrist.*

Conclusions: *The Rapid Office Strain Assessment (ROSA), can be used to quickly quantify ergonomic risks associated with each component of a typical computer workstation, and provide information to the ED provider regarding the need for change. In this small study, almost one-quarter of providers demonstrated ergonomic risk factors which make them susceptible to musculoskeletal disorders. With respect to cost, the best approach is to provide ergonomic training to clinicians, and then allow them to actively adjust their workspace.*

36. Ergonomic Risk Factors During Clinical Procedures in the Emergency Department

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Background and Objectives: *Although ergonomic analyses are widely used in industry, they have been conspicuously absent in health care. The goal of this study was to assess the prevalence of ergonomic risk factors in emergency department (ED) clinicians during clinical procedures.*

Methods: *This was a prospective, blinded, clinical assessment conducted over a 6-month study period. Emergency department clinicians (faculty, residents, and advanced practice providers) from a children's tertiary care facility and a university-affiliated hospital were observed during routine clinical procedures. None of these clinicians were aware of the purpose of the study. Trained observers completed a Rapid Entire Body Assessment (REBA) checklist to evaluate both upper and lower parts of the musculoskeletal system for biomechanical risks associated with the procedure. REBA final scores ranged in magnitude from 1 to 15, with each successive score representing an increased presence of risk factors. Our study hypothesis was that awkward postures during ED procedures are common regardless of the level of postgraduate training. Chi-squared and one-way analysis of variance tests were used to compare ergonomic assessments at each level of postgraduate training.*

Results: *Eight-six ED providers were observed during the study period, performing a total of 90 clinical procedures (e.g., laceration repair, intubation, etc.). Providers included residents (39.5%), advanced practice providers (34.9%) and faculty (25.6%). Most procedures were performed with the clinician standing stationary at the bedside (57%) or sitting without back support (40%). The REBA score did not differ significantly among the various levels of postgraduate training. Mean scores for faculty, residents, and advanced practice providers were 6.1 (SD 0.9), 6.4 (SD 1.0) and 5.9 (SD 0.8), respectively. Overall, 39.4% of clinicians were scored at high risk for musculoskeletal injuries (REBA score was >8); 45.5% of clinicians scored at medium risk for injury (REBA score 4-7). Causes of postural stress could be divided into four main categories: patient positioning, stretcher height, physician posture, and repetitive movements.*

Conclusions: *Awkward postures during ED procedures are common regardless of the level of postgraduate training. When used for prolonged periods these postures place the provider at increased risk of fatigue, pain, or injury. The majority of risk factors could be reduced by following basic ergonomic concepts.*

37. Cannabis-induced Anxiety Disorder in the Emergency Department

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Background and Objectives: 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 objective 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. Data collected included demographics, clinical features, and treatment outcomes in patients presenting to the ED with a chief complaint of anxiety. This group was then 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.

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%), and hallucinations (6.1%). Most of these patients (64.8%) also had associated cardiopulmonary complaints, such as chest discomfort, dyspnea, tachycardia, and hypertension. Compared to patients presenting with other forms of cannabis toxicity, those with anxiety were more likely to be younger, ingested edible cannabis, had psychiatric comorbidities, and/or a history of polysubstance abuse. Not surprisingly, more patients in the anxiety group were transferred to a psychiatric hospital (12.2% vs 3.6%, $p < 0.001$). The reliability of data collection ($k = 0.89$) showed excellent agreement.

Conclusions: Cannabis-induced anxiety occurred in 17% of ED patients in this community-based study. Because of the growing utilization of cannabis in our society, it is important that physicians and allied health professionals educate and involve our patients in a risk/benefit discussion concerning its use. More evidence-based research on the effects of cannabis use on the mental health and specific anxiety disorders will be needed as legislative momentum leads to continued approval of more lenient drug laws.

38. Breaking Bad News: How Doctors Communicate Life-threatening Diagnoses on Television

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Study objective: *Death notification and the delivery of bad news in the hospital or clinic is a communication skill that is important to address in medical education. Medical television (TV) dramas can act as educational tools and have the ability to affect patient-physician communication. Examples from popular medical dramas may serve as a means of educating students and residents by providing readily available vignettes. This study evaluated the portrayal of death-telling or delivering bad news on television and their possible value in medical training.*

Methods: *In this retrospective content analysis, television episodes of 10 popular television programs (e.g., ER, House, Grey's Anatomy) were viewed by trained researchers to identify every incident in the programs that depicted death-telling or delivering bad news in the hospital. The most recent, complete season of each medical program was examined (total, 181 episodes). Our classification scheme was based on 16 criteria recommended by a panel of academic clinicians and educators. After coding, each incident was classified as exemplary to poor based on the number of criteria met.*

Results: *A total of 116 incidents that depicted death-telling or delivering bad news were identified (mean, 0.64 incidents/TV episode). One member of the research team coded 10% of the episodes and a k-statistic was performed which showed an excellent degree of agreement ($k = 0.81$). Overall, 8.6% (10/116) of the incidents were classified as exemplary, 16.4% (19/116) as good, 44.8% (52/116) were satisfactory, and 30.2% (35/116) were rated as poor. Twenty-one of the incidents (18.1%) involved children as patients. Incidents depicting death-telling or delivering bad news were complicated by ethically questionable departures from standard practice (23.3%) and/or involved issues of professionalism (18.1%). Although TV programs often promoted physicians and nurses as heroes, the shows also presented scripts in which clinicians were arrogant, prejudiced, morally corrupt, and uncaring towards patients.*

Conclusions: *Television medical dramas contain many examples of death notification and the delivery of bad news which, in a classroom setting, could help to encourage residents and students in discussions of the best (and worst) techniques to communicate with patients and families.*

39. Evaluation of Commercially Available Suture Removal Kits

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Background and Objectives: *Many patients in the emergency department (ED) are willing and capable of removing their own nonabsorbable sutures at home if a suture removal (SR) kit was available. Despite the growing number of SR kits on the consumer market, there has not been a systematic evaluation to determine the cost, reliability, and degree of user-friendliness among the products. The purpose of this study was to evaluate the SR kits currently available on the market using non-medical adult volunteers.*

Methods: *This was a prospective randomized cohort study to compare four commercially available SR kits (labeled A-D). Sixty adult non-medical volunteers were given suture pads with four simple interrupted nylon sutures and asked to remove the sutures using each of the SR kits. Each kit evaluated was individually packaged and included disposable scissors, forceps, and a gauze sponge. The order of the SR kits used was randomized for each participant. Failure to successfully remove the sutures within two minutes or causing any trauma to the skin model were logged as failures. Suture removal was timed and satisfaction with each SR kit was measured using 5-point Likert scales. At the end of the simulation, participants were asked to rank the SR kits on degree of user-friendliness and quality of the instruments. Chi-squared and t-tests were used to compare key variables.*

Results: *Sixty volunteers completed the simulation without difficulty. The average time to remove the four sutures was 44.7 seconds (range 16 -149). Overall, participants ranked three of the four SR kits favorably. However, one kit stood out by having the shortest average suture removal time (38.2 seconds, $p=0.012$) and the fewest number of failures (13 failures, $p = 0.003$). This kit was also preferred by the majority of participants based on user-friendliness and the quality of the instruments. The retail price for this SR kit was between \$1.09 and \$5.95. Ultimately, participants preferred SR kits containing stainless steel instruments, Littauer scissors, sharp rather than blunt tools, and cross-hatched forceps.*

Conclusion: *Our data suggests that while most commercially available SR kits are inexpensive and acceptable to the public, the type and quality of instruments provided can alter end user satisfaction, time required for suture removal, and degree of unintended skin trauma. These factors should be in consideration when discharging an ED patient who has received sutures.*

40. Acute Toxicity Associated with Cannabis Use: Smoking Versus Snacking

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Background and Objectives: Greater availability of cannabis due to legalization and commercial availability has led to novel preparations of cannabis, including baked goods, various candies, and beverages. When these edibles are consumed, the effects of the primary psychoactive ingredient, THC (Delta-9-tetrahydrocannabinol), are much different than when cannabis is smoked. Our purpose was to compare the clinical effects and toxicity associated with the inhalation versus ingestion of cannabis products 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). Affiliated institutions included three rural medical centers, three university-affiliated hospitals and a children's tertiary care facility. Data collected included demographics, pre-hospital care, coingestants, clinical findings and hospital outcomes. Chi-squared and t-tests were used to compare the two study groups across key demographic and outcome variables.

Results: During the study period, 1039 patients were evaluated for THC toxicity; 175 visits (16.8%) were attributable to edible cannabis. The frequency of visits attributable to inhaled and edible cannabis increased throughout the study period. The average age of patients who ingested cannabis was 30.7 ± 16.5 (range, 1 to 84 years); those who inhaled cannabis was 27.8 ± 11.6 (range, 13 to 66 years). Eighteen patients (10.2%) who ingested cannabis were > 64 years and 11 (6.2%) were children < 12 years of age. ED visits attributable to inhaled cannabis were more likely to be for acute intoxication (49.2% vs. 36.9%, $P=0.003$) or cannabinoid hyperemesis syndrome (43.1% vs 4.7%, $P<0.001$). In contrast, visits due to edible cannabis had a wide range of psychiatric (25.2%), cardiovascular (20.4%), and neurologic complaints (15.6%). Reliability of the data abstraction was excellent, with a median kappa statistic of 0.88.

Conclusions: In this community-based study, ED visits attributable to cannabis toxicity have steadily increased following legalization of marijuana in our state. Those ingesting cannabis had a broader age range (1-84 years) and presented to the ED with a wider range of psychiatric, cardiovascular, and neurologic complaints.

41. Cardiopulmonary Symptoms in Patients with Cannabis Toxicity Presenting to Emergency Departments

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Background and Objectives: Increased availability and use of cannabis in Michigan have led to a marked increase in emergency department (ED) visits associated with the drug's cardiopulmonary effects. Our purpose was to describe the prevalence, clinical features, and disposition of cannabis cardiopulmonary toxicity 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 cardiopulmonary symptoms (CPS) versus those experiencing other forms of cannabis toxicity. Chi-squared and t-tests were used to compare these two groups across key demographic and outcome variables. A random sample of 10% of the charts were reviewed to determine inter-rater reliability.

Results: During the study period, 1135 patients were evaluated for cannabis toxicity. A total of 312 patients (27.5%) had a cardiopulmonary chief complaint (CPS group) and 823 (72.5%) experienced other forms of cannabis toxicity, predominantly symptoms of intoxication (41.7%), cannabis hyperemesis syndrome (29.5%) or neuropsychiatric complaints (22.6%). The CPS group presented with tachycardia (44.3%), chest tightness (34.9%), dyspnea (31.1%), palpitations (21.5%), and hypertension (18.9%), diaphoresis (14.2%) and syncope (11.3%). CPS patients were more likely to be older (34.0 vs. 24.3 years, $p<0.001$), have comorbidities (36.7 vs 11.6%, $p<0.001$) and a history of polysubstance abuse (23.5 vs 9.9%, $p<0.001$). These patients also had a longer ED length of stay (6.0 vs 2.8 hours, $p<0.001$) and significantly more hospital admissions (9.0% vs 5.2%, $p<0.001$). Reliability of data collection ($k = 0.90$) showed excellent agreement.

Conclusions: Cardiopulmonary toxicity is common after acute or chronic cannabis exposures, occurring in over one-quarter of ED patients in this community-based study. These troublesome findings highlight the risks associated with the use of cannabis for recreational or therapeutic purposes.

42. Nasal Foreign Body Removal: Success Rates for Techniques and Devices

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Background and Objectives: Nasal foreign bodies (NFB) in children are a common complaint in the emergency department (ED) and rarely cause significant morbidity. However, NFBs such as batteries and magnets can cause extensive, permanent damage and require emergency removal. A dislodged NFB can also be displaced into the airway, resulting in aspiration or fatal airway obstruction. The purpose of this study was to describe our experience with the various techniques for NFB removal in a cohort of children presenting to the ED in West Michigan.

Methods: This was a retrospective cohort analysis of all pediatric (<19 years) patients evaluated in the emergency department with a diagnosis of nasal foreign body. Our objective was to examine the types of NFBs in children, the various removal techniques used by ED clinicians and the related complications and treatment failures. The study took place at seven US hospitals over a 7-year study period (December 2013 and November 2020). Affiliated institutions included three rural medical centers, three university-affiliated hospitals and a children's tertiary care facility. Standardized abstraction forms were utilized to guide data collection. Data collected included demographics, type of NFBs, removal techniques, treatment failures, final disposition, and complications. The main outcome criteria were the rate of first attempt success for each technique. Descriptive statistics (frequency tables, confidence intervals) were used to summarize the data. One investigator performed a blinded critical review of a random sample of 20% of the medical records to determine inter-rater reliability using Kappa statistic.

Results: During the study period, 1246 children presented to the ED with a total of 1213 NFBs. Forty-seven children had no evidence of NFB seen on ears, nose and throat (ENT) exam and were excluded from study. The mean age of the remaining 1199 children was 3.1 ± 2.2 years; 55.0% were female. Thirty-seven (3.1%) had NFBs in both nostrils; 25 (2.1%) had more than one NFB; and 2 children had foreign bodies in the ear as well as the nose. NFBs were located in the right naris in 57.9% of children for a duration of 16.5 ± 72.5 h. Forty-six different types of NFBs were identified; the most common were beads (29.7%), food (18.6%), small toys (14.3%), tissue/paper (9.9%) and rocks (5.6%). Fifteen children (1.3%) had button batteries or magnets documented. A total of 96.4% (95% CI, 95.2 to 97.4%) of NFBs were removed using one or more extraction techniques. Approximately 71.9% (95% CI, 69.3 to 74.4%) of NFBs were removed on the first attempt; 18.7% (95% CI, 16.6 to 21.0%) on the second attempt; and 5.8% (95% CI, 4.5 to 7.2%) required three or more attempts. Based on the chart documentation, the choice of extraction technique used depended on a number of clinical factors. These included the location of the NFB, the degree of nasal obstruction, the clinician's comfort with the removal method, the shape and consistency of the NFB, the age of the child, the patient's compliance, the need for restraint and the supplies available. Forty children (3.3%) were referred to otolaryngologist for removal of NFBs. Four patients were directly admitted to surgery: one with bilateral NFBs, one child with autism, one child with cerebral palsy, and one with a button battery. Complications occurred in 46 children (3.8%) and included mild epistaxis, swallowed NFB, pain from the procedure, and posterior displacement of NFB. No cases of aspiration were documented. The interrater reliability was excellent with a median kappa of 0.89.

Conclusions: A large number of simple removal techniques are available for NFBs in children. Choice of techniques depends on the location, age of the child, the type of foreign body, clinician's comfort with removal method, and the supplies available. These methods are not time-consuming and do not require complex equipment. The first attempt at removal of a foreign object is the one most likely to succeed.

43. Vulvovaginal Lacerations Following Consensual Versus Non-consensual Vaginal Penetration

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Background and Objectives: *The literature on vaginal lacerations following consensual versus nonconsensual intercourse is sparse and conflicting. Our objectives was to compare the predisposing factors, injury location, injury severity, and treatment of vulvovaginal lacerations sustained during consensual sexual intercourse versus nonconsensual sexual intercourse, in adult women within a community-based cohort.*

Methods: *Retrospective analysis of adult women presenting to the emergency departments of five hospitals and a free-standing nurse examiner clinic during a seven-year study period. All patients had documented vulvovaginal lacerations and reported consensual (CSI) or nonconsensual sexual intercourse (NCSI) within 72 hours. The primary outcomes were the location and severity of vulvovaginal lacerations between the two patient groups.*

Results: *A total of 598 cases were identified: 81 (14%) reported CSI, and 517 (87%) reported NCSI. CSI patients were younger (21.3 vs 25.7, $p < 0.001$), had a shorter time interval from vaginal penetration to examination (9.6 vs 17.2, $p < 0.001$), and a greater incidence of penile penetration (97.5% vs 75.9%). NCSI subjects had a greater number of mean vulvovaginal lacerations (1.7 vs. 1.0, $p < 0.001$), but injuries were generally smaller (1.1 cm vs. 4.3 cm, $p < 0.001$) and were more likely to be located on the posterior vulva (83% vs. 69%, $p = 0.003$). All of the lacerations in the NCSI group were superficial. In contrast, 33% of CSI subjects (27) had lacerations sutured in the ED; six (7%) required aggressive fluid resuscitation and ten (12%) were taken to the operating room.*

Conclusions: *In this community-based population, more severe vulvovaginal lacerations were noted in women following consensual intercourse. The predisposing factors, injury location, and subsequent treatment in this group were significantly different when compared with women reporting nonconsensual intercourse.*

44. Pediatric Vulvo-vaginal Lacerations in a Community-Based Population

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Background and Study Objectives: Genital trauma in children is generally uncommon and has been reported to range between 0.2-8% of all reported traumatic incidents. The aim of this study was to describe the mechanism, injury pattern, treatment, and the outcome of lacerations to the female genital tract in children and adolescents presenting to the emergency department (ED).

Methods: This was a retrospective, cohort analysis of consecutive children and adolescents (1-15 years) diagnosed with vulvovaginal lacerations. Patients were seen at seven EDs over an eight-year study period (2012-2019). Spanning 13 counties in Michigan, affiliated institutions included three rural medical centers, three university-affiliated hospitals and a children's tertiary care facility. Mechanism of injury, clinical findings, treatment in the ED, and final disposition were recorded using standardized abstraction forms. All patients were examined by board-certified emergency clinicians, trained to perform medicolegal examinations. Procedure or operative notes were reviewed to define the extent of vulvovaginal injuries and time and type of definitive treatment. Descriptive statistics (frequency tables, confidence intervals) were used to summarize the data.

Results: During the study period, 912 children were evaluated for genital trauma; 201 (22.0%) had vulvovaginal lacerations. The mean patient age was 6.3 +/- 6.4 years; mean time to presentation was 5.7 +/- 4.0 hours. Straddle injuries were the most common mechanism of injury (76.6%), followed by falls (8.0%), blunt trauma (5.0%), and accidental penetrating injuries (3.5%). Lacerations due to sexual assault were documented in four patients (2.0%). Overall, wounds were located on the labia majora and minora (68.7%), posterior fourchette or perineum (18.9%), and hymen/vagina (12.4%). The majority were superficial wounds (56.2%) with a mean length of 1.1 cm (range 0.5-6 cm). Although gynecologic consultation was obtained in 74/201 (36.8%), deeper lacerations were repaired in the ED using procedural sedation (34.8%). Nine children (4.5%) were taken to the operating room for surgical repair. Uncontrolled bleeding, young age, poor visualization of injury, or a combined injury to the vulva and vagina increased the need for operative intervention. Postoperative course in all patients was uneventful.

Conclusions: Most vulvovaginal lacerations in children are minor and result from straddle injuries. In this community-based population, 35% had lacerations that were repaired in the ED; only 4% required operative intervention. Uncontrolled bleeding, young age, poor visualization, or a combined injury to the vulva and vagina increased the need for surgery.

45. Implementation of a Standardized Scoring Tool to Promote Safe Discharge of Low-Risk Chest Pain Patients in the Emergency Department

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Background and Objectives: *This Quality Improvement (QI) project aimed to implement a standardized clinical pathway for Emergency Department (ED) patients with a primary complaint of chest pain and to subsequently increase provider documentation rates of the HEART Score, an ED-specific chest pain risk stratification tool.*

Methods: *An interdisciplinary team including physicians and nurses collaborated to create a QI bundle to adopt a standardized pathway to evaluate ED patients presenting with a primary complaint of chest pain and to increase documentation of the HEART Score by emergency providers to promote safe patient discharge. Donabedian's methodology was used as a framework for intervention selection. Major components of the quality improvement bundle are outlined. Excel was used to calculate an unpaired two-tailed-test without the assumption of equal variances which was applied to evaluate the pre-and post-intervention periods for statistical significance.*

Results: *For the pre-intervention period (Jan-March 2021), 32.48 % of chest pain-related visits had a HEART Score documented across eight sites included in the quality improvement cohort. For the post-intervention period (Oct-Dec 2021), 72.61% of chest pain-related visits had a recorded HEART Score. The unpaired two-tailed-test without the assumption of equal variances demonstrated a statistically significant change in HEART Score documentation across all sites. Additionally, safe discharge rates of low-risk chest pain patients were at 97% in December of 2021, favorably above the ≥88% quality benchmark established by the Michigan Emergency Department Improvement Collaborative (MEDIC).*

Conclusions: *Standardizing the use of an evidence-based risk stratification tool for ED patients presenting with a chest pain-related visit is feasible within a large, multi-center physician group. Implementation of the tool and standardized pathway effectively increased the percentage of ED patients with a chest-pain-related diagnosis with a HEART Score documented and improved performance towards the MEDIC quality measure safe discharge for adults with low-risk chest pain. By November of 2021, the QI goal of documenting a HEART Score on greater than 75% of patients presenting with a chest pain related diagnosis was achieved and has been subsequently sustained.*

46. Impact of an Emergency Department Quality Improvement Initiative to Decrease Inappropriate Medications in the Elderly

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Background and Objectives: *Drug use in the elderly is fraught with many problems because of the physiologic changes of aging and potential drug-drug and drug-disease interactions. In January 2019, our hospital implemented an Emergency Department (ED) quality improvement initiative to decrease inappropriate medications in the elderly. This goal was met through geriatric-focused education and interdisciplinary staffing, providing standardized approaches to medical care, and timely feedback to ED clinicians. The aim of this study is to evaluate whether implementation of this initiative was associated with reductions in potentially inappropriate medications (PIM).*

Methods: *This was a retrospective before and after study of consecutive adult patients (> age 64) seen at one academic ED with level 3 GEDA (Geriatric Emergency Department Accreditation). The study period (July 2018 to May 2021) spanned 6 months before the project was initiated to 29 months after its implementation. Evaluation of the use of PIM was done using the Beers criteria 2019. Demographic information, medical history, treatment, and disposition were obtained from ED records using a structured abstract. Descriptive statistics (frequency tables, confidence intervals) were used to summarize the data. Our hypothesis was that the percentage of elderly patients with at least one PIM each month would be effectively lowered in the post-implementation group compared to the baseline period.*

Results: *During the study period, a total of 30,135 elderly patients met the inclusion criteria; average 861 ± 78 evaluated per month. Between baseline and re-measurement periods, the number of elderly patients receiving PIM each month declined from 10.8% to 6.0% [percent difference 4.8%; 95% CI 3.9 to 5.7%]. This equates to a relative monthly reduction of 44.4%. The most prescribed PIMs after the quality improvement initiative were lorazepam (22.8%), metoclopramide (18.5%), meclizine (17.9%), and orphenadrine (11.4%).*

Conclusions: *Implementation of the quality improvement initiative in the ED was associated with a modest decrease in potentially inappropriate medications for elderly patients. Future research should examine whether general educational interventions, such as educational workshops and clinical pharmacists, might affect PIM prescribing.*

47. Comparative Analysis of the Diagnosis and Treatment of Vertigo in Elderly Emergency Department Patients

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Background and Objectives: *Benign paroxysmal positional vertigo (BPPV) is the most frequent form of vestibular dysfunction in elderly emergency department (ED) patients. BPPV affects a significant portion of younger adults as well. The Dix-Hallpike test—the standard for BPPV diagnosis—is not common in the ED setting. If no central origin of the vertigo is determined, patients in the ED are typically treated with benzodiazepine, antihistamine, or anticholinergic agents. Studies have shown that these pharmaceutical treatment options may not be the best for elderly patients with BPPV. The aim of this study is to analyze ED provider habits in the diagnosis and treatment of vertigo among elderly patients.*

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 a 6-month study period (October 2018 – April 2019). Data collected included demographics, clinical features, diagnostic testing, imaging, and ED treatment in two age groups (< 65 years versus ≥ 65 years). Chi-squared and t-tests were used to compare the age 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 329 adult ED patients met the inclusion criteria; 126 (38%) were over 65 years of age and 203 (62%) were younger. The mean duration of vertiginous symptoms in both groups were similar (41.1 ± 75.6 hours). More elderly patients had a computed tomography (CT) of the head ordered compared to the younger group (62% vs 24%, $p < 0.001$). Only 13% of both age groups (43/329) had a Dix-Hallpike test performed in the ED. Pharmaceutical treatment was given to 93% of all BPPV patients in the ED; the most common drugs were meclizine, scopolamine, and diazepam. Canalith repositioning maneuvers were used in 4% of patients, regardless of age. Elderly patients were more likely to be admitted (25% vs 10%, $p < 0.001$) or referred to a neurology clinic for follow-up (6% vs 1%, $p = 0.009$). Reliability of data collection ($k = 0.88$) showed excellent agreement.*

Conclusions: *Omission of a simple clinical test, the Dix-Hallpike, can result in patients undergoing unnecessary, expensive investigations regardless of age. Although ED providers commonly prescribe drug therapy for vertiginous symptoms, many of these older patients could be successfully treated with canalith repositioning maneuvers.*

48. Spin Cycle: Diagnosis and Treatment of Vertigo in the Emergency Department Setting

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Background and Objectives: *Vertigo is a common clinical manifestation in the emergency department (ED). It is important for clinicians to determine if the peripheral cause of vertigo is benign paroxysmal positional vertigo (BPPV), a disorder accounting for 20% of all vertigo cases. However, the Dix-Hallpike test—the standard for BPPV diagnosis—is not common in the ED setting. If no central origin of vertigo is determined, patients in the ED are typically treated with benzodiazepine, antihistamine, or anticholinergic agents. Studies have shown that these pharmaceutical treatment options may not be the best for patients with BPPV. The purpose of this study is to analyze ED provider habits in the diagnosis and treatment of vertigo.*

Methods: *This was a retrospective cohort analysis of consecutive adult patients with a discharge diagnosis of peripheral vertigo. Patients were seen at seven emergency departments (EDs) over a 5-month study period (October 2018 – March 2019). Data collected included demographics, clinical features, diagnostic testing, imaging, and ED treatment. Chi-squared and t-tests were used to compare these two groups across key demographic and outcome variables. Descriptive statistics (mean, SD) and frequency tables were used to describe the key demographic and outcome variables.*

Results: *A total of 250 adult ED patients met the inclusion criteria; average age 59.2 ± 19.7 years. The mean duration of vertiginous symptoms was 42.5 ± 90.3 hours. Overall, 45.6% had a computed tomography (CT) of the head ordered. Only 17.2% (43/250) of patients had a Dix-Hallpike test performed in the ED. Pharmaceutical treatment was given to 89.6% of patients in the ED; the most common drugs were meclizine, scopolamine, and diazepam. Canalith repositioning maneuvers were used in 14 patients (5.6%) with good results in most of these patients (9/14). Eight patients (3.2%) were referred to the neurology clinic for follow-up.*

Conclusions: *BPPV is the most common cause of vertigo, occurring spontaneously in the 50-to-70-year age group. Omission of a simple clinical test, the Dix-Hallpike test, can result in patients undergoing unnecessary, expensive investigations. Although ED providers commonly prescribe drug therapy for vertiginous symptoms, well over 90% of these patients could be successfully treated with canalith repositioning, a simple outpatient maneuver that moves the particles back into the utricle.*