Background: Advanced airways (e.g., endotracheal tubes, supraglottic airways) are frequently placed by Emergency Medical Services (EMS) in patients with out-of-hospital cardiac arrest (OHCA). However, the optimal timing of advanced airway placement during the sequence of resuscitation events is unknown. We hypothesized that earlier advanced airway placement would be associated with increased probability of return of spontaneous circulation (ROSC). Methods: This secondary analysis of ROC PRIMED study data included adult, non-traumatic, OHCA patients with advanced airway placement by EMS prior to ROSC. Patients were excluded if EMS witnessed the arrest or arrest time was unknown. The primary exposure variable was time from EMS arrival to advanced airway placement. The outcome variable was ROSC. A Cox proportional hazards model was constructed to estimate the probability of ROSC as a function of the time to advanced airway placement using non-linear penalized splines. The Cox model was stratified by initial cardiac rhythm, accounted for resuscitation duration, and adjusted for Utstein variables associated with increased ROSC, regardless of initial cardiac rhythm.

Results: Seventy agencies were classified as high field termination agencies (HFTAs) and low field termination agencies (LFTAs). Generalized estimating equation models were used to compare HFTAs and LFTAs.

Conclusions: Early advanced airway placement is associated with increased ROSC, regardless of initial cardiac rhythm. The probability of ROSC was 59%, 55%, 51%, 45%, 39%, and 33% with airway placement at 5, 10, 15, 20, 25, and 30 minutes, respectively. For non-shockable rhythms, the probability of ROSC was 43%, 40%, 35%, 30%, 25%, and 20% at the same airway intervals. Conclusion: EMS advanced airway placement for OHCA has a time-dependent association with ROSC. Early advanced airway placement is associated with increased ROSC, regardless of initial cardiac rhythm.
sions: After adjustment for provider characteristics including experience, delivering death notifications, and high workload burnout, while training was protective. Important limitations include response bias, recall bias and the cross-sectional nature of this evaluation. Future research is needed to explore the underlying causes of this relationship.

4. INCIVILITY AMONG NATIONALLY CERTIFIED EMS PROFESSIONALS IS LINKED TO WORKFORCE-REDUCING FACTORS


Background: Incivility is defined as negative interpersonal acts that violate norms for social interaction, ranging from breaches of etiquette to outright harassment. In other healthcare settings, incivility has been linked to negative individual and organizational effects, although scant literature exists concerning incivility in the unique, high-stress EMS environment. Our study explored the association between incivility and stress, career satisfaction, turnover intentions, and workplace absence among EMS professionals. We hypothesized that incivility would be linked to poorer personal and occupational well-being.

Methods: Based on a sample size calculation, 38,000 nationally-certified EMS professionals received an electronic questionnaire. Incivility was measured using an EMS-adapted Workplace Incivility Scale (WIS). Stress was measured using the depression anxiety and stress scale (DASS). Satisfaction was measured using a 4-point Likert scale and high self-reported workplace absence was classified as missing 10 or more days of work in the previous 12 months. Non-military, practicing EMSs or higher were included in the analysis. Multivariable logistic regression was conducted using a priori selected covariates based on directed acyclic graphs to obtain adjusted odds using a priori selected covariates based on multivariable logistic regression was conducted to determine the relationship between OD-OHCAs and C-OHCAs. Multivariable logistic regression was carried out to compare survival between the two groups.

Results: There were a total of 21,689 confirmed OHCA during the study period. After excluding non-C-OHCAs/non-OD-OHCAs, 18,988 cases remained. Overall, 18,001 (94.8%) of cases were C-OHCA and 967 (5.2%) were OD-OHCA. There was a significant increase in the proportion of OD-OHCAs between 2010-2014, 4.6% (95% CI = 3.8-5.4) and 2015-2016, 6.4% (95% CI = 5.7-7.3). Mean age for OD-OHCA was 64.2 years (95% CI = 0.001) and location of OD-OHCA was more likely residential 66.6% vs. 54.0% (p < 0.001). Shockable rhythm was present in 47.2% (95% CI = 25.6% of C-OHCA (95% CI = 0.001). Bystander CPR was performed in 49.4% of OD-OHCAs vs. 48.3% of C-OHCAs (p = 0.5221). Overall, discharge to the OD-OHCA group was 18.6% vs. 11.9% in the C-OHCA group (p < 0.001). After risk adjustment, there was an aOR of 2.0 (1.6-2.5) for survival in OHCA compared to the OD-OHCA group compared to the C-OHCA group.

Conclusions: This statewide study found a significant upward trend in the proportion of OD-OHCAs as well as differences in population demographics and epidemiology. Given the varying etiology, location, and age, it is surprising that the bystander CPR rates were nearly identical. It is likely that regional variations in OD-OHCAs exist and emergency medical systems should track data to optimize their prevention and resuscitation efforts.

6. DEATH BY SUICIDE: THE EMS PROFESSION COMARED TO THE GENERAL PUBLIC

Bentley Bobrow, Micah Panczyk, Robyn Blust, Paula Brazil, Taylor George, Vatsal Chikani, Chengcheng Hu, Daniel Spaite, Arizona Department of Health Services

Background: EMS professionals face high levels of chronic physical/emotional stress and Post Traumatic Stress Disorder related to prehospital care. Suicide has been linked to other first responder professions, and to those in law enforcement, presumably related to multiple chronic stressors. While high-profile anecdotal EMS suicide cases and national survey data on suicide ideation/attempts have received much attention, there is a paucity of data on EMT suicide completions. We sought to determine the nationwide statewide proportionality of suicide completions as compared to the general population (GP) in Arizona. Methods: Observational study of adults (≥18 yrs; 1/2009–12/2015). The Arizona Health Information Management System-Electronic Death Registry was queried with manual review of decedent occurrence free-text fields. These data were compared to the non-EMT cohort aggregate of all other occupations combined.

Conclusions: There were a total of 3497,935 GP deaths (all causes) of which 7775,225 (2.2%) were by suicide. EMS death rate (1.3% vs. 1.4% vs. 3.1% vs. 4.8%) was linked to poorer personal and occupational well-being.

Suicide was defined based on ICD-10 E-Codes. The proportionate mortality ratios (PMRs) for suicide were compared between the groups, adjusting for age, sex, race, and ethnicity. Results: There were a total of 349,793 GP deaths (all causes) of which 77,775 (2.2%) were by suicide. EMS death rate (1.3% vs. 1.4% vs. 3.1% vs. 4.8%) was linked to poorer personal and occupational well-being. This first responder profession has a high suicide rate when compared to the general population, even after controlling for age, sex, race, and ethnicity. This is the first study that we are aware of to compare EMS suicide completions with the general public. Hopefully this increased awareness and spur studies to elucidate underlying causes and evaluate the effectiveness of interventions.

7. ASSESSMENT OF THE RAPID ARTERIAL OCLUSION EVALUATION RACE SCALE IN REAL-WORLD PRACTICE FOR PREDICTION OF LACunar INFARCT OCCURRENCE AND REDUCING TIME TO THROMBECTOMY

Peter Antevy, Brijesh Mehta, Ashutosh Jadhav, Joy Sessa, Randy Katz, Haoyang Duong, Andrey Lima, Gina Dimartini, Lakota Woodall, Ryan McTaggart, Ronil Chandra, Thaddeus-Lezlie Mazow, Joshua Hirsch, Albert Yoo, Tudor Jovin, Raoul Nogueira, Memorial Healthcare System Category of Submission: MEDICAL

Background: Prehospital identification of potential large vessel occlusion (LVO) stroke patients may lead to faster triage and treatment. We examined whether the Rapid Arterial Occlusion Evaluation (RACE) scale can be reliably implemented in a real-world setting with multiple EMS agencies and lead to rapid treatment. Methods: A prospective study was performed at a high volume comprehensive stroke center. In the first phase, eight EMS agencies were educated on use of the RACE scale using an online training video. All EMS stroke alerts were recorded. When EMS RACE score was 5 or higher, the neurocath lab team was alerted prior to EMS arrival as part of a parallel workflow. Upon emergency department arrival, the following characteristics were tracked: NIHSS score, RACE score, CT findings, presence of LVO and workflow time metrics.

Results: During the study period (January 2016 to June 2017), RACE score was provided for 797 of 1498 EMS stroke alerts (55%). Higher prehospital RACE scores correlated with NIHSS and RACE scores. LVO was found in 13% of patients with an available RACE score. A RACE score of 5 or higher was able to identify 64% of all LVO patients (sensitivity: 64%; specificity: 72%; PPV: 30%; NPV: 95%; accuracy: 71%; Youden’s index). However, of the 260 patients with RACE score 5 or higher, only 66 patients (26%) were found to have LVO. A RACE score of 5 or higher was found to be independently associated with LVO. Among 499 patients with RACE score less than 5, LVO was present in 38 patients (8%). When an EMS stroke alert with high RACE score triggered early alert of the neurocath lab team, median door to groin puncture time for thrombectomy was 68 minutes compared to 91 minutes for cases with sequential workflow. Conclusions: The RACE scale can be
successfully implemented across EMS agencies and results in faster to door time, with a reduction of 5 or more minutes, associated with greater likelihood of LVO, there are significant numbers of false positives. Further refinement of prehospital stroke severity scales is warranted to improve the accuracy of this approach.

8. **Effecting Neurologically-Intact Survival for Children with Out-of-Hospital Cardiac Arrest**

**Paul Pepe, Paul Banerjee, Aminnder Singh, Latha Ganti**, University of Texas Southwestern Medical Center

**Background**: EMS crews commonly limit on-scene care for pediatric out-of-hospital cardiac arrest (POHCA) patients, typically attempting to provide transport during scene care. Hypothesis: Neurologically-intact survival (POHCA) patients, typically attempting scene care for pediatric out-of-hospital cardiac arrest, and EMS providers have not been effected by a provider level. Our objective was to describe and compare the most common factors in the decision to leave EMS among EMTs and paramedics. As education requirements and practice settings vary between EMTs and paramedics, we hypothesized that reasons for leaving EMS differed by certification level. **Methods**: This was a cross-sectional analysis of an electronic questionnaire deployed in June 2017 to all nationally-certified EMTs and paramedics who did not renew National EMS Certification during the 2016-2017 recertification period ending on March 31, 2017. Since National EMS Certification is not required to renew a license in all states, participants were asked if they were currently practicing in EMS. Inclusion criteria consisted of those who reported not working full-time, or worked within the 12 months with a Bonferroni adjustment for multiple comparisons. We utilized Fisher’s exact test with a Bonferroni adjustment for multiple comparisons to evaluate differences in reasons for leaving EMS between EMTs and paramedics. **Results**: Of 793/51,344 survey responses (response rate 10%) and 2,703 met inclusion criteria. Most were EMTs (85%, n = 2,291) and 15% were paramedics (n = 412). For EMTs, the most commonly selected reason for leaving EMS was the pursuit of further education (22%), while paramedics most commonly cited a desire for better pay and benefits (20%). A two-fold increase in the proportion of paramedics that selected illness/injury/disability compared to EMTs (13% vs. 6%, p < 0.001). Three times as many paramedics selected stress/burnout compared to EMTs (9% vs. 3%, p < 0.001). Only 5% of EMTs listed retirement as the most important factor for leaving EMS compared to 14% of paramedics (p < 0.001). Excluding those who left for retirement, 68% of EMTs stated they intended to return to EMS, compared to 52% of paramedics (p < 0.001). Considerable differences in the reasons for leaving EMS differed by provider level. Of concern, a larger proportion of paramedics reported illness/injury/disability as their primary reason for leaving the profession compared to EMTs. Additionally, fewer paramedics reported an intention to return to EMS. Limitations include potential response bias and confounding.

10. **Do Age Appropriate Vital Sign Cut Points Improve the Predictive Ability of the Physiologic Criteria of the Field Triage Decision Scheme for Identifying Children Who Need the Resources of a Trauma Center**

**E. Brooke Lerner, Jeremy Cushman, Mohamed Badawy, Amy Drendel, Courtney Jones, Manish Shah, David Gourlay**, Medical College of Wisconsin Category of Submission: Trauma

**Background**: Prior research found the Field Triage Decision Scheme’s (FTDS) physiologic step is a moderate predictor of pediatric trauma center (TC) need. Predictive ability could be hindered by the application of adult values to children when defining abnormal vital signs. Our objective was to determine the accuracy of the FTDS physiologic step when traditional cut points are compared to age-appropriate cut points for identifying children needing TC resources. **Methods**: A prospective study of all injured children ≤15 years, regardless of severity, transported by EMS to pediatric TC was conducted in three mid-sized cities. EMS providers were interviewed to obtain patient demographics and auscultation or blood pressure (BP), and respiratory rate (RR). **Results**: EMS and outcome data were available for 9,484 children. 2% of all patients needed the resources of a TC. 11% of patients met the physiologic criteria of the FTDS, but there were no cut points were used and 23% when age-specific cut points were used. Using the traditional physiologic criteria, 46% of children needing a TC would have been under-triaged and 10% over-triaged (+LR 5.44, 95% CI 4.75-6.24). Using the age-specific physiologic criteria, 40% would have been under-triaged and 22% would have been over-triaged (+LR 2.69, 95% CI 2.40-3.01). The traditional RR cut point had a +LR of 3.12 (95% CI 2.94-3.4). The age-specific RR cut point had a +LR of 1.86 (95% CI 1.50-2.29). The traditional SBP had a +LR of 5.28 (95% CI 3.35-8.34). The age-specific SBP had a +LR of 6.10 (95% CI 5.34-10.00). EMS did not obtain RR in 16% and SBP in 28% of cases. **Conclusions**: The accuracy of the physiologic step of the FTDS is not improved by using age-specific criteria. The rate of under-triage is decreased while the rate of over-triage is increased.
13. Effectiveness of Prehospital Hypertonic Saline for Hypotensive Patients: A Systematic Review and Meta-Analysis

Ian Blanchard, Argham Ahmad, Karen Tang, Paul Ronksley, Diane Lorenzetti, Gerald Lazarengo, Eddy Lang, Christopher Doig, H Stelfox, Alberta Health Services/University of Calgary Category of Submission: Professional

Background: The optimal prehospital fluid for the treatment of hypotension is unknown. Hypertonic fluids, meaning that the composition of solutes is higher to that of the human body, may increase circulatory volume and mute the pro-inflammatory response of the body to injury. The purpose of this study was to determine whether in patients presenting with hypotension in the prehospital setting (post) the administration of hypertonic saline (intervention), compared to an isotonic fluid (control), improves survival to hospital discharge (outcome). Methods: In this PROSPERO registered review, searches were conducted in Medline, Embase, CINAHL, and CENTRAL from the date of database inception to November, 2016, and included all languages. Two reviewers independently selected randomized control trials of hypertensive human participants administered hypertonic saline in the prehospital setting. The comparison was isotonic fluid, whereas hypertonic saline, and near isotonic fluids such as Ringer’s Lactate. Assessment of study quality was done using the Cochrane Collaborations’ risk of bias tool and a fixed effect meta-analysis was conducted to determine the pooled relative risk of survival to hospital discharge. Secondary outcomes were reported for fluid requirements, multi-organ failure, length of hospital stay, long term survival and disability. Results: Of the 1,160 non-duplicate citations screened, 38 articles underwent full-text review, and five trials were included in the systematic review. All studies administered a fixed 250 mL dose of 7.5% hypertonic saline, except one that administered 300 mL. Two studies used normal saline, two Ringer’s Lactate, and one Ringer’s Acetate as control. Routine care co-interventions included isotonic fluids and colloids. Five studies were included in the meta-analysis of hypertonic saline (intervention) with minimal statistical heterogeneity ($I^2 = 0$%). The pooled relative risk of survival to hospital discharge with hypertonic saline was 1.02 times the risk of death compared to isotonic saline (95% CI: 0.95, 1.10). There were no consistent statistically significant differences in secondary outcomes. Conclusions: There was no significant difference in the pooled relative risk of survival to hospital discharge, length of hospital stay, long term survival and disability. There was no significant difference in the pooled relative risk of survival to hospital discharge compared to isotonic saline in the prehospital setting. Hypertonic saline cannot be recommended for use in prehospital clinical practice for the management of hypotensive injured patients based on the available data.

14. Are EMS Provider Characteristics Associated with Appropriate Responses During Violent Encounters?

Donald Garner, Mallory DeLuca, Remle Crowe, Rebecca Cash, Madison Rivard, Jefferson Williams, Donald Garner, Mallory DeLuca, Remle Crowe, Rebecca Cash, Madison Rivard, Jefferson Williams, Jessica Jeruzal, Lori Boland, Monica Frazer, Charles &c, Andrew Stevens, Allina Health Emergency Medical Services Category of Submission: Cardiac

Background: Violence against Emergency Medical Services (EMS) providers is increasing. Little is known regarding providers’ response during these encounters. Recognition and management of threatening situations is key to provider and patient safety. Our objective was to evaluate the association between provider characteristics and the response to escalating threats of violence during EMS calls. We hypothesized that providers with greater EMS experience and access to de-escalation training were more likely to escape threatening situations. Methods: EMS providers of a large county-based system participated in specially-developed patient care scenarios for 51 standardized data elements, including call type, de-escalation attempts, and escape. Our primary outcome was whether the provider escaped before the scenario ended. Our secondary outcome was whether a provider attempted an adequate de-escalation attempt. Descriptive statistics and univariable odds ratios (OR, 95% CI, p-value) were calculated. Results: We evaluated 272 EMS providers as individual members of two-person crews, with <33% missing data. Overall, 55% ($n = 145/263$) made an adequate de-escalation attempt and 55% ($n = 147/268$) escaped the unsafe scene. Of those who did not escape, nearly half (44%, $n = 53/120$) also did not make an adequate de-escalation attempt. EMS experience (p = 0.31) and military background (p = 0.39) were not associated with odds of de-escalation. A two-fold increase in odds of adequately attempting de-escalation was observed for providers with Crisis Intervention Training (CIT) (<3 years experience, p = 0.02). As experience increased, a stepwise decrease in the proportion of providers that escaped was noted (p-trend = 0.01). Providers with >2 years of EMS experience had 64% lower odds of escaping (0.36, 0.17–0.76, p < 0.01; referent:<5 years experience). Providers with military experience (0.38, 0.18–0.84, p < 0.01; referent: no military experience) and CIT training (0.37, 0.20–0.67, p < 0.01) also had reduced odds of escaping. Conclusions: Nearly half of EMS providers failed to escape a simulated scene with threat of physical violence. Experiencing providers and those with military or CIT training had lower odds of escaping. Limitations include that these results were obtained in a training environment. Future research should focus on developing training to improve recognition of failed de-escalation and the need to escape an unsafe scene.

15. Performance Characteristics of the Modified Rapid Arterial Occlusion Evaluation Scale (MRACE) to Predict Large Vessel Occlusion

Hinnah Siddiqui, Denisse Sequeira, Marcus Robinson, Christian Martin-Gill, Francis Gentile, Department of Emergency Medicine, The University of Pittsburgh School of Medicine Category of Submission: Student, Resident, Fellow

Background: Stroke is a leading cause of disability in the United States. The most debilitating strokes are caused by large vessel occlusion (LVO), and patient outcomes are improved through delivery of time-sensitive endovascular therapies at comprehensive stroke centers (CSCs). The Rapid Arterial Occlusion Evaluation (RACE) scale can identify LVO and facilitate triage to CSCs, with published sensitivity of 68% and specificity of 85% at score of ≥5. We aimed to demonstrate the implementation feasibility and performance of prehospital MRACE scale, which does not assume the laterality of aphasia and agnosia symptoms, to identify LVO. Methods: The MRACE scale was implemented in 12 EMS agencies, scoring both aphasia and agnosia regardless of laterality of symptoms to improve the ease of training and capture of atypical symptoms. Training consisted of a didactic presentation followed by video and hands-on demonstrations of patient scenarios. A step-by-step scoring guided paramedics through the exam. MRACE data were collected prospectively and documented.
upon completion of the prehospital electronic health record. A project coordinator obtained informed consent from the patients for those individuals transported to UPMC facilities. Analysis included descriptive statistics and performance characteristics (sensitivity, specificity, positive predictive value [PPV], and negative predictive value [NPV]).

Results: From December 2015 to July 2017, a prehospital mRACE scale was completed for 780 patients with suspected stroke. Complete-in-hospital data were available for 517 (66%) of these. 186 had a mRACE scale of ≥5. There were 188 (36%, CI 32–40%) cases with final diagnosis of ischemic stroke of which 65 (35%) had CVA. This yield was greater (75.3% CI 72–79%) sensitivity, 66.8% (CI 65–73%) specificity, 56.3% (CI 45–67%) PPV, and 83.8% (CI 75–90%) NPV with a ROC AUC of 0.76 for the discrimination of LVO.

Implementing the mRACE prehospital scale to identify patients with LVO is feasible and performs similarly to the RACE scale without paired t-test for the pre- and post-shock value. Further research is necessary to determine if implementation of the mRACE scale leads to increased interventions for patients with LVO and subsequent decreased mortality.

16. EFFECTS OF FAILED DEFIBRILLATION: ATTEMPTS ON WAVEFORM CHARACTERISTICS OF THE POST-DEFIBRILLATION ELECTROCARDIOGRAM

Jacob Thomas, David Salcido, James Menegazzi, Department of Emergency Medicine, University of Pittsburgh School of Medicine

Background: The morphology of the electrocardiogram (ECG) of the ventricular fibrillation (VF) waveform during cardiac arrest can be quantified using signal analysis (QEGC). Studies have shown that QEGC measures may be predictive of defibrillation success.

We sought to quantify the effect of failed rescue shocks on the QEGC measures for patients with VF in out-of-hospital cardiac arrest (OHCA). We considered a failed shock to be one in which the ECG rhythm was VF prior to and after the shock. We hypothesized that failed rescue shocks would lead to worsened QEGC measures.

Methods: Electrocardiogram data were obtained from non-traumatic, EMS-treated OHCA cases from the Resuscitation Outcomes Consortium (ROC) Continuous Chest Compression trial. For each shock, amplitude, spectrum for AmSMA, median slope (MS), centroid frequency (CF), and detrended fluctuation analysis (DFA) were calculated for the lowest artifact-free chest compression period prior to and after the shock. We used custom-built MATLAB programs to perform QEGC calculations. QEGC values were compared using a paired t-test for the pre- and post-shock values.

Correlation coefficients were also calculated between the time from shock to post-shock window and the change in QEGC values. Receiver Operating Curve (ROC) analysis at 5, 10, 15 total shocks, 1,399 shocks were analyzable. 520 were the first shock. For all shocks, AmSMA increased from 4.83 to 5.60 (p-value < 0.01). MS increased from 2.36 to 2.44 (p-value < 0.01). CF increased from 7.05 to 7.16 (p-value < 0.01). DFA did not show any change: 1.28 to 1.27. For only first shocks, similar results were observed. No correlation approached significance to post-QEGC measurement and the change in QEGC values.

Conclusions: For all the QEGC measures except for DFA, slight improvement in values was observed. While statistically significant, these changes may not be physiologically or clinically meaningful. Possible explanations include: (1) These may be a result of the CPR delivered in between the shock and the post-shock QEGC; (2) The pre-shock values started very low which may make decreases difficult to detect from a floor effect; (3) Possible early pre-shock waveforms may be less harmful than those previously studied.

17. EPIDEMIOLOGY OF MORTALITY IN PATIENTS TRANSPORTED BY EMERGENCY MEDICAL SERVICES (EMS)

Ian Blanchard, Dan Lane, Tyler Williamson, Brent Hagel, Gerald Lazarenko, Ian Phelps, Darren Rocheek,elman Scales, Eddy Lang, Chris Toosha, Dean Hinds Services/University of Calgary Category of Submission: Professional

Background: Outside of key conditions such as cardiac arrest and trauma, little is known about the epidemiology of mortality at all EMS patients. The purpose of this study was to describe characteristics of EMS patients who after transport, die in a health care facility. Metrics: EMS transport events over one-year (April, 2015-2016) from a BLS/ALS system serving an urban/rural population of approximately 2 million was linked to in-hospital administrative databases(emergency department[ED] and inpatient). Infection, and sepsis cases were classified based on ED infectious disease diagnosis code, and an existing sepsis algorithm based on ED diagnosis codes and EMS clinical information. Clinical characteristics including age, (Glasgow Coma Score (GCS)<15, tachypnea (≥22/minute), and fever (T>37.6 Celsius). Abnormal events such as prehospital time (minutes), transport distance from municipality to hospital, and high-priority Medical Priority Dispatch System (MPDS) determined if patients were evaluated in adults (>18 years) and compared to patients not meeting sepsis criteria.

Two sided t-test or difference of proportion were used with statistical significance <0.05.

Results: 131,174 unique adult encounters were successfully linked to in-hospital databases (98% linkage rate). The one-year incidence of infections, and sepsis was 1%, respectively. A minority of all patients with infections presented with fever (18%), abnormal GCS (22%) or tachypnea (32%). Compared to other patients, adults with sepsis were more likely to have an abnormal GCS (60% vs. 16%, p < 0.001), tachypnea (48% vs. 20%, p < 0.001), or fever (25%/5%, p < 0.001). They were generally older (mean 75 vs. 60 years, p < 0.001), and more likely to have a high priority MPDS determinant (38% vs. 31%, p < 0.001). Sepsis patients had longer total transport distances (15/9.3 vs.16/9.9 km/miles, p = 0.004). The in-hospital mortality rate for patients with sepsis was 17% (95% CI, 16.4–7.2), and 19% for sepsis (95%CI, 18.21). Conclusions: Infections and sepsis are common among paramedic-transported patients, and paramedics spend a considerable time with these patients prior to arriving in the ED. The these patients frequently have altered vital signs, suggesting earlier recognition may be feasible. The in-hospital mortality of these patients is significant, supporting the need for further research into opportunities for prehospital identification and intervention.

18. EPIDEMIOLOGY OF INFECTIONS AND SEPSIS IN A LARGE CANADIAN EMERGENCY MEDICAL SERVICES (EMS) SYSTEM

Daniel Lane, Ian Blanchard, Gerald Lazarenko, Christopher Oleywick, Laurie Morrison, Hannah Wunsch, Sheldon Cheskes, Steve Lin, Refik Sasaki, Damon Scales, Institute of Health Policy, Management and Evaluation, University of Toronto Category of Submission: STUDENT, RESIDENT, FELLOW

Background: Sepsis is a life-threatening syndrome caused by a dysregulated immune response to infection. Early recognition and intervention are currently the best clinical outcomes. In modern healthcare systems paramedics often encounter patients with sep-
sis before other clinicians, offering an important opportunity for modern intervention. The goal of this study was to estimate the incidence and examine characteristics of patients with infec-
tions, and sepsis transported by paramedics.

Methods: A one-year cohort of all adults (> = 18 years) transported by a BLS/ALS EMS system serving a rural/urban population of approximately 2 million was linked to in-hospital administrative databases(emergency department[ED] and inpatient). Infection, and sepsis cases were classified based on ED infectious disease diagnosis code, and an existing sepsis algorithm based on ED diagnosis codes and EMS clinical information. Clinical characteristics including age, (Glasgow Coma Score (GCS)<15, tachypnea (≥22/minute), and fever (T>37.6 Celsius). Abnormal events such as prehospital time (minutes), transport distance from municipality to hospital, and high-priority Medical Priority Dispatch System (MPDS) determined if patients were evaluated in adults (>18 years) and compared to patients not meeting sepsis criteria.

Two sided t-test or difference of proportion were used with statistical significance <0.05.

Results: 131,174 unique adult encounters were successfully linked to in-hospital databases (98% linkage rate). The one-year incidence of infections, and sepsis was 1%, respectively. A minority of all patients with infections presented with fever (18%), abnormal GCS (22%) or tachypnea (32%). Compared to other patients, adults with sepsis were more likely to have an abnormal GCS (60% vs. 16%, p < 0.001), tachypnea (48% vs. 20%, p < 0.001), or fever (25%/5%, p < 0.001). They were generally older (mean 75 vs. 60 years, p < 0.001), and more likely to have a high priority MPDS determinant (38% vs. 31%, p < 0.001). Sepsis patients had longer total transport distances (15/9.3 vs.16/9.9 km/miles, p = 0.004). The in-hospital mortality rate for patients with sepsis was 17% (95% CI, 16.4–7.2), and 19% for sepsis (95%CI, 18.21). Conclusions: Infections and sepsis are common among paramedic-transported patients, and paramedics spend a considerable time with these patients prior to arriving in the ED. The these patients frequently have altered vital signs, suggesting earlier recognition may be feasible. The in-hospital mortality of these patients is significant, supporting the need for further research into opportunities for prehospital identification and intervention.

19. COMBINED PREHOSPITAL HYPOXIA-HYPOTENSION "DEPTH-DURATION DOSE" AND MORTALITY IN MAJOR TRAUMATIC BRAIN INJURY

Daniel Spaitte, Chenghong Hu, Bentley Bobrow, Vatsal Chikani, Bruce Barnhart, Joshua Gaither, P. David Adelson, Kurt Denhoffing, Amber Rice, Chad Visconti, Dustin Sherrill, Proposal Category: Category of Arizona Category of Submission: Trauma

Background: Our previous work has shown that the depth-duration doses of prehospital hypoxia (SpO2 < 90%) and hypotension (SBP < 90 mmHg), separately, are strongly asso-
ciated with mortality in Traumatic Brain Injury

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22. PREVALENCE OF MORTALITY DUE TO REBOUND TOXICITY AFTER “TREAT AND RELEASE” PRACTICES IN PREHOSPITAL OPiate ODSease CARE: A Systematic Review and Meta-Analysis

Jennifer Greene, Brent Deaveu, Justine Dol, Micheal Butler, Dalhousie University Category of Submission: MEDICAL

Background: Death from fentanyl overdose was declared a public health crisis in Canada in 2015. Traditionally, patients who have overdosed on opiates and attained toxic levels are transferred to emergency medical services (EMS) are treated with the opiate antagonist naloxone, provided ventilatory support and subsequently transported to hospital. However, certain EMS agencies have allowed paramedics who have reversed an opiate overdose to refuse transport, if the patient has the capacity to do so. The safety of this practice has not been examined by a systematic review. Therefore, our intent is to examine the available literature to determine the prevalence of mortality and serious adverse events within 48 hours of EMS treat and release due to suspected rebound opiate toxicity during naloxone administration.

Methods: A systematic search was performed on May 1st 2017 through the Cochrane Central, Embase, and CIALHL using search strategies developed with the aide of a health sciences librarian. No search limits were applied. Included studies were required to be peer-reviewed. Two authors conducted the screening, selection and data extraction process. Discrepancies were resolved via discussion. A modified QUADAS tool was used to assess risk of bias. Analysis for prevalence of outcomes were preformed. Results: A total of 1,401 records were screened after duplicate removal. Eighteen full text studies were reviewed for eligibility for inclusion. Included studies had a low risk of bias. The prevalence of mortality within 48 hours was so infrequent that it could not be quantitatively meta-analyzed. There were 4/4912 (0.00081%) total reported deaths of suspected rebound etiology from included patients across all studies. Only one study reported on adverse events of patients released on scene. This study found no incidence of adverse events from their sample of 71 released patients.

Conclusions: Mortality or serious adverse events in the included studies due to rebound toxicity in patients released on scene post EMS treatment with naloxone was rare. Despite limited studies, the prevalence rate was so low that we concluded that this practice may be safe in terms of mortality and may be considered an alternative of traditional transport. Additional prospective studies need to be performed to strengthen knowledge around adverse events.

23. PREHOSPITAL qSOPA SCORE AS PREDICTOR OF SEPSIS AND MORTALITY: Eileen Shu, Crystal Ives Tallman, Megann Young, William Frye, Leyla Farshidpour, Danielle Campagne, UCSF-Fresno; Department of Emergency Medicine Category of Submission: MEDICAL

Background: The quick Sequential [Sepsis-2] Organ Failure Assessment (qSOPA) score was proposed in 2016 as a rapid way to identify adult patients with suspected infections who are likely to have poor outcomes. A 2015 study showed that qSOPA could predict hospital mortality, 48-hour mortality and critical care admission, but the qSOPA score was not validated in the prehospital setting. We hypothesize that prehospital qSOPA scores are correlated with up-triage change to a higher acuity level of care in the emergency department, and mortality.

Methods: We conducted a...
retrospective observational study using prehospital ambulance vital signs to calculate qSOFA scores of medical patients that presented in September 2016 to a large academic emergency department in Fresno, CA. Information from the electronic health record (EHR) was used to describe the triage presence of sepsis, hospital admission, ICU admission, and in-hospital mortality. Results: A total of 1,903 adult medical patients were transported by ambulance to the emergency department during the study period. Of these, 151 patients (7.9%) were prehospital qSOFA positive. A positive prehospital qSOFA score was correlated with emergency department diagnosis of infection (29.1% vs. 15.2%; p < 0.001), hospital admission (55.0% vs. 33.4%; p < 0.001), ICU admission (9.93% vs. 2.22%; p < 0.001), admission to the ED (49.2% vs. 3.08%; p < 0.001), and in-hospital mortality (6.62% vs. 0.74%; p < 0.001). A positive prehospital qSOFA score was not associated with up-triage (7.95% vs. 5.29%; p = 0.291), however, it was correlated with final triage to a high acuity zone in the emergency department (35.8% vs. 8.96%; p < 0.001). Conclusions: Prehospital qSOFA score correlated with the diagnosis of sepsis and sepsis. Furthermore, it is correlated with poorer patient outcomes including need for hospital admission, ICU admission, and in-hospital mortality. However, a positive prehospital qSOFA score in isolation does not appear to be more useful than the current triage process in the emergency department to identify patients who should be triaged to a high acuity zone in the absence of other patient factors.

24. PREHOSPITAL PROVIDER ATTITUDES AND BELIEFS REGARDING PEDIATRIC SEIZURE MANAGEMENT: A MULTICENTER, QUALITATIVE STUDY

John Carey, Jonathan Studnek, Lorin Browne, Malcolm Leimio, Daniel Ostermayer, Tyler Minick, Maria A. Ananda, Dariusz J. Wojcik, Stephanie Schroeder, E. Brooke Lerner, Manish Shah, Bayor College of Medicine, Pediatrics, Section of Emergency Medicine Category of Submission: Pediatric

Background: Seizures have the potential to cause both accidental injury and mortality and are a common reason EMS are requested for a child. A pediatric prehospital seizure evidence-based guideline (EBG) was published and implemented as prehospediation in multiple EMS systems. Knowledge translation and protocol adherence in medicine can be incomplete. In EMS, systems-based factors and providers’ attitudes and beliefs may contribute to incomplete knowledge translation. The purpose of this study was to identify EMS provider-reported attitudes, beliefs, barriers, and enabling factors to adherence to EBG-derived seizure protocols in multiple EMS systems. Methods: This was a qualitative study utilizing 30-minute semi-structured interviews of paramedics who recently transported actively seizing 0-17 year olds in two different urban EMS systems. Interviewers explored the providers’ decision-making during their recent case and regarding seizures in general. Two investigators used NVivo software, the grounded theory approach, and constant comparison to independently analyze each interview. Interviews continued until thematic saturation was reached. Results: Several overarching themes emerged from the 32 interviews. Enablers included licensing/protocol references, training, provider knowledge about preferred routes, predefined provider roles, options to use different medical control, identification of critical care teams, prehospital drug administration, and physical accessibility of medication on scene. Systems barriers included equipment availability, controlled substance management, infrequent training, few pediatric calls, underdosinginkle, and incorrect protocol and reference tool dosing. Personal barriers included fear of respiratory depression, confusion about dosing, and misconceptions about preferred routes, febrile seizure management, and accurate methods of weight estimation. Paramedics shared other opinions about management: preference for medication, need for intramuscular medication, how transport distance affects management, use of online medical control, and the need to manage bystanders. Providers suggested solutions to address equipment, medication, protocol, and training limitations. Conclusions: Paramedics identified many standardized strategies EMS systems used that enabled pediatric seizure protocol adherence, as well as numerous systems-based and personal barriers to adherence. Providers identified solutions to address the barriers. Conducting research on EMS protocol changes, policy modifications, and training that address the barriers identified in this study may enhance understanding of how to optimize prehospital seizure outcomes.

25. ANALYSIS OF DOsing ERRORS Made BY Paramedics in Pediatric Patient Scenarios after Implementation of State-Wide Pediatric Drug Dosing Reference

John Hoyle, Glenn Ekbland, Tracy Hoever, Bill Fales, Richard Lammers, Dena Smith, Western Michigan University, Homer Stryker, MD School of Medicine Category of Submission: Pediatric

Background: Medication errors occur at a high rate for prehospital pediatric patients. Epinephrine dose errors have been 60% to reduce errors, Michigan implemented a pediatric dosing reference (PDR), with doses listed in milliliters, the requirement that doses be drawn into a smaller syringe from a pre-loaded syringe using a stop cock and dilution of drugs to standard concentrations. The purpose of this study was to evaluate the prevalence of medication errors by paramedics treating pediatric patients after the implementation of a state-wide pediatric drug dosing reference. Methods: 13 EMS agencies completed 2 validated, pediatric scenarios: infant seizure and infant cardiac arrest. Agencies were private, public, not for profit, for profit, urban, rural, or mixed. Simulations took place in a simulation center or mobile simulation unit. EMS crews used their regular equipment with sham drugs and were required to carry on all the steps to adminster a drug dose. Two evaluators scored crew performance via direct observation and video review. A dose error was defined as > 20% difference compared to the weight-appropriate dose. Descriptive statistics were utilized. Results: 80 simulations have been completed and initial analysis has been conducted using descriptive statistics. The majority of crews were EMT/EMT-P. In cardiac arrest scenarios, 8/20 (40%; 95% CI 18.5%, 61.5%) epinephrine doses were incorrect. In 0/20 doses, there was no cross check of the drug volume prior to administration. There were 6, ten-fold overdoses and one, ten-fold underdose. In seizure scenarios, 5/11(45%; 95% CI 16%, 74.9%) benzodiazepine doses were incorrect (2 underdoses, 3 overdoses), 2/9 (22%; 95% CI 0%, 49.4%) drug dilutions were incorrect resulting in large dosing errors. In 1/10 (10%) of the cases the crew was unable to dilute DS0 to DS2. Unrecognized air bubbles were frequently entrained in the administration syringe resulting in underdoses. We hypothesize that the majority of errors were due to the incorrectypedilution and length-based tape for weight determination. Conclusions: Epinephrine dose errors have decreased since implementation of PDR, but frequent ten-fold errors still occur. Cross checking of drug doses during combination is recommended with dilution and length-based tape use. Error reduction strategies are needed for pediatric prehospital drug administration.

26. TRAINING IN PREHOSPITAL DEATH NOTIFICATIONS Linked to Improved PROVIDER Comfort and PREPARATION

Abraham Campos, Rebecca Cash, Remie Crowe, Madison River, Brian Clemency, Robert Sworn, Ashley Paraskiv, Enrique F. Backus, Department of Emergency Medicine, University of Nebraska Medical Center Category of Submission: Student, Resident, Fellow

Background: Death notifications in the prehospital setting are difficult situations that require training. However, this training is not uniformly included in initial EMS education, and the proportion of providers prepared for this task is unknown. Our objectives were to describe the prevalence of death notification training by provider level and its association with preparation and comfort in performing this task. We hypothesized that more providers received training and that training was associated with greater preparation and comfort. Methods: An electronic questionnaire was sent to a random sample of 20,001 nationally-certified EMS professionals in April 2017. Participants reported death notification training received during initial or continuing education and adult death notifications performed in the past 12 months. Level of comfort and preparation in delivering adult death notifications was rated using a 4-point scale. Inclusion criteria were practicing, non-military, EMTs or higher. Certification level was grouped into advanced life support (ALS: paramedic/intermediate/AEMT) or basic life support (BLS: EMT). Odds ratios (OR, 95%CI, p-value) were calculated to estimate the association between training and provider comfort and preparation. Results: There were 2,333 responses (12% response rate), and 1,514(65%) met inclusion criteria. Most respondents had performed at least one adult death notification in the past year (ALS: 87%, BLS: 78%, p < 0.001). Equal proportions of ALS and BLS (51% versus 50%, p = 0.58) respondents received death notification training during an initial course, however fewer BLS respondents received additional training (BLS: 30% versus ALS: 44%, p < 0.001). A larger proportion of ALS respondents did not receive any death notification training (BLS: 40%, ALS: 32%, p = 0.005). Over one-third (34%) of those without training had performed an adult death notification in the past year. After controlling for certification level, training was associated with increased odds of reporting greater comfort (2.20, 1.77–2.75, p < 0.001) in performing death notifications. Conclusions: Most providers delivered a death notification in the past year; however, one-third of these EMS providers had not received training and training was associated with greater comfort and preparation in delivering death notifications. Limitations include recall bias attributed to self-report. Future work would include barriers to receiving death notification training.

27. REDUCTION IN CERVICAL SPINE IMMOBILIZATION IS NOT ASSOCIATED WITH MISSED INJURIES

Jennifer Gibson Chambers, Michael O’Brien, Brian Clemency, University at Buffalo Category of Submission: Student, Resident, Fellow

Background: Previous studies have demonstrated EMS providers can correctly determine which patients have spine injuries and patients arriving at the emergency

7
department via EMS without a cervical collar rarely have serious cervical spine injuries. In a retrospective chart review of patients transported by a single large, commercial EMS agency with a dispatch for motor vehicle collision to one of three hospitals. EMS and hospital data were reviewed for 1,000 patients between the study periods of 1 January–June 2015 and 6-month period after (January–June 2016) the protocol change. Fisher exact test was used for statistical comparisons between time periods. Cervical spine injuries identified on CT were considered serious if the patient required operative intervention, discharge in an immobilization collar or cervical spine injuries present in patients that died as a result of traumatic injuries. Results: There were 1,614 patient records identified, 819 under the immobilization protocol and 796 under the EMS-adapted protocol use decreased from 66.8% to 59.3% (p = 0.002). There was no significant difference between time periods in proportion of male patients, average age, or size of vehicle accident. No significant change was observed in the rate of CT cervical spine imaging (51.0% before and 52.5% after, p = 0.55). Serious cervical spine injuries were identified in 2.2% before and 2.4% after (p = 0.002). There were no significant decreases in the percentage of injured patients after SMR (p = 0.99). All patients with serious cervical spine injury were placed in cervical collars by EMS providers, a sensitivity of 100%. The specificity was 14.0% before and 18.7% after SMR (p = 0.10). Conclusions: Despite decreased use of cervical collars under the SMR protocol, there were no motor vehicle accident patients with serious cervical fractures transported without a cervical collar in either period. These findings may not generalize to other mechanisms of injury.


Remle Crowe, Rebecca Cash, Madison Rivard, William Gilmore, Alex Christgen, Remle Crowe, Rebecca Cash, Madison Rivard, William Gilmore, Alex Christgen

Abstract: The Field Triage Decision Scheme (FTDS) is designed to identify severely injured patients and guide EMS providers’ selection of a destination hospital, but a minimal amount is known regarding the real-world application of these criteria. We aimed to identify the factors that influence EMS destination decisions, the extent to which FTDS decisions align with the FTDS, and explore EMS provider-identified reasons for over- and under-triage of older adults. Methods: We conducted a prospective multi-center study in four hospitals within a county, one of which was a verified Level I trauma center which serves a nine-county region of over one million people. We enrolled all older adults aged 55 or older who sustained an injury of any severity and were transported by EMS. Research staff administered a standardized interviews-based survey with the patient’s EMS provider. FTDS criteria was used as the gold standard to assess patterns of destination decisions and adherence to protocol. We used descriptive statistics to characterize the sample and used chi-square tests to assess factors that influenced destination decisions and agreement between EMS decisions and the FTDS. Proporions were used to quantify reasons for under- and over-triage. Results: Data from 4,295 patients were analyzed. The median age was 75 years and 99% were female. Using the FTDS as a gold standard for destination decisions, 1,584 patients (43%) were over-triaged and 285 (42%) were under-triaged. There were only 2 patients (2%) who met the mechanism criteria who were under-triaged, compared to 154 (41.1%) and 141 (47.2%) who met the physiologic and anatomic criteria who were under-triaged, respectively. Of those who were over-triaged to the non-trauma centers the most frequently cited reasons by EMS was patient request (64.4%) and patient specialty (35.3%). Conclusions: EMS provider destination decisions are influenced by mechanism of injury, but a substantial proportion of patients who met the mechanism and physiologic or anatomic criteria of FTDS were under-triaged. Both under- and over-triage appear to be heavily influenced by patient preference.
decompression. High-risk complications can arise if utilizing an inappropriate needle size. No staging according to Broselow Pediatric Emergency Tape color as determined by deformity, anasarca, prior open thoracotomy, or location. We established four groups based upon BroselowTM grouping and anatomic site.

Three investigators reviewed chest CTs of pediatric board-certified radiologist, obtained recorded height. Investigators, trained by a pediatric board-certified radiologist, obtained standardized CT measurements of chest wall thickness at four points: right/left second intercostal space at the midclavicular line (ICS-MCL) and right/left fourth intercostal space in the anterior axillary line (ICS-AAL). Our outcome was a measurement height and interquartile ranges (IQR) for each Broselow grouping and anatomic site.

Results: To date, 225 chest CTs have been reviewed. Median patient age was 5 years and 52.4% were male. Children measuring Broselow Blue/Orange (<68 cm), had a median chest wall thickness at the right ICS-MCL, of 1.5 cm (IQR 1.3 cm, 1.7 cm), left ICS-MCL, 1.6 cm (IQR 1.5 cm, 2.0 cm), right ICS-AAL 1.7 cm (IQR 1.5 cm, 1.9 cm), left ICS-AAL 1.6 cm (IQR 1.4 cm, 2.2 cm). Children measuring Broselow Red/Purple (68–90 cm): right ICS-MCL 1.5 cm (IQR 1.3 cm, 1.9 cm), left ICS-MCL 2.0 cm (IQR 1.7 cm, 2.1 cm), right ICS-AAL 1.8 cm (IQR 1.6 cm, 2.2 cm), left ICS-AAL 1.6 cm (IQR 1.3 cm, 2 cm), Children measuring Broselow Yellow/White (90.1–115 cm): right ICS-MCL 2.1 cm (IQR 1.5 cm, 2.3 cm), left ICS-MCL 1.9 cm (IQR 1.6 cm, 2.3 cm), right ICS-AAL 1.8 cm (IQR 1.7 cm, 2.1 cm), left ICS-AAL 1.7 cm (IQR 1.5 cm, 2.1 cm). Children measuring Broselow Blue/Orange/Red/Green (>115 cm): right ICS-MCL 2.4 cm (IQR 2.1 cm, 2.9 cm), left ICS-MCL 2.4 cm (IQR 2.1 cm, 2.9 cm), right ICS-AAL 2.1 cm (IQR 1.7 cm, 2.9 cm), left ICS-AAL 2.1 cm (IQR 1.6 cm, 2.9 cm).

Conclusions: Median chest wall thickness varies little by height or location in children measuring Broselow grouping. Yellow/White (90.1–115 cm) had a median chest wall thickness of 1.8 cm (IQR 1.6 cm, 2.2 cm), left ICS-AAL 1.8 cm (IQR 1.6 cm, 2.2 cm), right ICS-AAL 1.7 cm (IQR 1.5 cm, 2.1 cm). Children measuring Broselow Grouping and Anatomic Site.

Methods: This was a retrospective analysis of out-of-hospital cardiac arrest (OOHCA) for those who underwent vector change defibrillation, compared to those who received standard treatment.

Results: Of these, 88,751 patients or 52.6% (52.3–52.8%) had a stroke scale documented. Additionally, 140,294 patients, or 83.1% (82.9–83.3%) had a blood glucose documented. For each of these measures, we also calculated the 95% confidence interval. Results: Over a 6 1/2-year period, we identified 168,854 patients with 91-1 calls who had an impression of acute stroke. Of these, 88,751 patients or 52.6% (52.3–52.8%) had a stroke scale documented. Additionally, 140,294 patients, or 83.1% (82.9–83.3%) had a blood glucose documented. Conclusions: In this study, we calculate the first national benchmarks of two important clinical performance measures on stroke care described by EMS Compass. Important findings were poor performance of stroke screens with only 52.6% of all 9-1 calls for stroke having them documented. At 83.1%, agencies performed better with blood glucose documentation. These results provide initial benchmarks and provide a starting point for improvement of both the measures documentation systems, and clinical performance.

Discussion: Advanced Cardiac Life Support treatments are standard treatment. No staging according to Broselow Pediatric Emergency Tape color as determined by deformity, anasarca, prior open thoracotomy, or location. We established four groups based upon BroselowTM grouping and anatomic site.

Three investigators reviewed chest CTs of pediatric board-certified radiologist, obtained recorded height. Investigators, trained by a pediatric board-certified radiologist, obtained standardized CT measurements of chest wall thickness at four points: right/left second intercostal space at the midclavicular line (ICS-MCL) and right/left fourth intercostal space in the anterior axillary line (ICS-AAL). Our outcome was a measurement height and interquartile ranges (IQR) for each Broselow grouping and anatomic site.

Results: To date, 225 chest CTs have been reviewed. Median patient age was 5 years and 52.4% were male. Children measuring Broselow Blue/Orange (<68 cm), had a median chest wall thickness at the right ICS-MCL, of 1.5 cm (IQR 1.3 cm, 1.7 cm), left ICS-MCL, 1.6 cm (IQR 1.5 cm, 2.0 cm), right ICS-AAL 1.7 cm (IQR 1.5 cm, 1.9 cm), left ICS-AAL 1.6 cm (IQR 1.4 cm, 2.2 cm). Children measuring Broselow Red/Purple (68–90 cm): right ICS-MCL 1.5 cm (IQR 1.3 cm, 1.9 cm), left ICS-MCL 2.0 cm (IQR 1.7 cm, 2.1 cm), right ICS-AAL 1.8 cm (IQR 1.6 cm, 2.2 cm), left ICS-AAL 1.6 cm (IQR 1.3 cm, 2 cm), Children measuring Broselow Yellow/White (90.1–115 cm): right ICS-MCL 2.1 cm (IQR 1.5 cm, 2.3 cm), left ICS-MCL 1.9 cm (IQR 1.6 cm, 2.3 cm), right ICS-AAL 1.8 cm (IQR 1.7 cm, 2.1 cm), left ICS-AAL 1.7 cm (IQR 1.5 cm, 2.1 cm). Children measuring Broselow Blue/Orange/Red/Green (>115 cm): right ICS-MCL 2.4 cm (IQR 2.1 cm, 2.9 cm), left ICS-MCL 2.4 cm (IQR 2.1 cm, 2.9 cm), right ICS-AAL 2.1 cm (IQR 1.7 cm, 2.9 cm), left ICS-AAL 2.1 cm (IQR 1.6 cm, 2.9 cm).

Conclusions: Median chest wall thickness varies little by height or location in children measuring Broselow Grouping and Anatomic Site. Background: Patients in ventilricular fibrillation who do not respond to in-arhythmia treatment may benefit from vector change defibrillation (DSED). DSED has been proposed as a viable option for patients in rVF. Although the mechanism by which DSED terminates rVF is not well understood, the possibility of new treatments to assist in the delivery of quality bystander CPR. The aim of this randomized trial was to assess the effectiveness of instructor’s real-time, objective feedback during CPR training compared to conventional feedback in terms of trainee’s CPR quality. Methods: We performed a cluster randomized trial of community CPR training at Nowon District Health Center in Seoul. CPR training classes were randomized into either intervention (instructor’s objective real-time feedback based on Laerdal QCPR Classroom) or control (conventional feedback) group. Laerdal QCPR Classroom software is a real-time feedback device, which monitors quality of real-time CPR performances of multiple trainees simultaneously. During each trainee’s sequences or interventions, performed a total of five CPR. The primary outcome was the total score, which is an overall measure of chest compression quality. Generalized linear mixed models were used to analyze the outcome data from baseline to fifth CPR session, accounting for both cluster- and individual-level covariates. Results: A total of 77 training sessions were randomized into 37 intervention (996 trainees) and 40 control (898 trainees) groups. At baseline, both groups had equal overall CPR quality scores (76 in both groups). During the course of the training, QCPR feedback significantly increased trainees’ overall quality of CPR performance compared with conventional feedback (p < 0.01). Particularly significant difference between the two groups was observed for changes in compression depth from baseline to fifth CPR session with a mean change of 4.5 mm in the intervention group and 2.7 mm in the control group (p < 0.01). Conclusions: Considering the rate of chest compression, we did not observe a statistically significant difference between two groups (p = 0.06). In this randomized trial, instructor’s objective real-time feedback resulted in improved overall CPR quality.
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EMs resuscitation rates in 2016 and 2017 were
response intervals, indications for initiating
two years (July 1, 2015 through June 30, 2017).
range 15–20%) but rose steadily during the
2014 and March 31, 2015, quarterly (all-rhythm)
discussions stated that PPE had some restric-
tions/difficulties in using the head/torso-
position (\( p = 0.0002 \)) were statistically
more likely in patients with higher rates of tPA administration. Analy-
asis was done using the R-statistical computing
software. Results: During the study period, 379
patients presented via EMS; 126 arrived within
3.5 hours of their last known normal (LKN). EMS
suspected a CVA in 107 (85%). Prenotifi-
cation was given in 52 of these calls. During the
Cincinnati Prehospital Stroke Scale (CPSS),
prenotification was 24% higher in patients with
slurred speech (\( p = 0.01 \)), 24% higher with arm
drift (\( p = 0.01 \)), and 20% higher with facial
droop (\( p = 0.04 \)). In a multivariate logistic
regression including the three components of the
CPSS, slurred speech was the most unreliable
factor for prenotification (\( p = 0.09 \), fol-
lowed by arm drift (\( p = 0.14 \)), and facial droop
(\( p = 0.56 \)). With appropriate prenotification,
there was a 47% increase in the odds of receiv-
ing tPA (\( p = 0.06 \)). Conclusions: Prehospital providers
are not consistently providing preno-
tification. In our cohort, EMS prenotified the ED
in patients with more severe and recent onset
symptoms. Similar to other studies showing
improved time interval metrics with preno-
tification, our study suggests that prenotification
was associated with higher rates of tPA admin-
istration. There may be a benefit to dedicating
resources toward EMS education on the role
of prenotification in the stroke chain of survival.

39. INTERACTION EFFECTS OF COMMUNITIES AND ADVANCED AIRWAY MANAGEMENT ON SURVIVAL AFTER OUT-OF-HOSPITAL CARDIAC ARREST; MULTI-LEVEL ANALYSIS

Dongsun Choi, So Yeon Kong, Taehan Kim, Jeong Ho Park, Kyoung Jun Song, Young Sun Ro, Ki Ok Ahn, Sang Do Shin, Seoul National University Hospital, Department of Emergency Medicine Category of Submission: CARDIAC

Background: Chest compression and adequate ventilation are essential for oxygen delivery in out-of-hospital cardiac arrest (OHCA). The association between prehospital advanced airway management (AAM) and survival out-
comes was inconsistent. We hypothesized that differences in the application of prehospital AAM between regions due to medical resource
would have an effect on the effectiveness of the AAM. The aim of this study was to inves-
tigate whether the effect of AAM on outcomes between regional EMS systems of
four Asian cities. Methods: We used a PAROS (Pan-asia resuscitation outcomes study) registry. We identified patients with OHCA, pre-
sumed cardiac etiology who were resuscitated by emergency medical services in four Asian cities between 2012 and 2014. OHCA patients
were witnessed by EMS personnel and age
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11

43. AMPLITUDE SPECTRUM AREA CHANGES DURING CARDIOPULMONARY RESUSCITATION AFTER DIFFERENT DURATIONS OF UNTREATED CARDIAC ARREST IN A PORCINE MODEL OF VENTRICULAR FIBRILLATION WITH CONCURRENT ACUTE MYOCARDIAL INFARCTION

Giuseppe Ristagno, Francesca Fumagalli, Weilun Quan, Giovanni Babini, Roberto Latini, Yongqin Li, IRCSS-Istituto di Ricerche Farmacologiche Mario Negri, Milan, Italy. CATEGORY OF SUBMISSION: CARDIAC

Background: Amplitude spectrum area (AMSA) is a predictor of successful defibrillation (DF). In this study, we investigated the effect of high quality cardiopulmonary resuscitation (CPR) on AMSA in relationship with the duration of untreated ventricular fibrillation (VF) in a preclinical porcine model with a concurrent acute myocardial infarction.

Methods: An established model of myocardial infarction followed by VF was used. Forty-four pigs were subjected to different VF durations: 8–10 minutes (short), n = 14; 12 minutes (intermediate), n = 21; and 13–15 minutes (long), n = 9. Continuous mechanical CPR (Lucas, PhysioControl) with ventilation with oxygen and epinephrine administration (1 mg at 2 minutes of CPR) was performed for 5 minutes (short or intermediate) or 10 minutes prior to a VF arrest. Both VF and changes in AMSA during CPR (dAMSA) were evaluated, in relationship with the duration of untreated VF, coronary perfusion pressure (CPP), and epinephrine administration.

Results: Overall AMSA decreased from 13.7 ± 0.8 mV Hz to 6.5 ± 1.7 mV Hz during the 15 minutes VF (dAMSA −7.2 ± 2.5 mV Hz, p < 0.01), while it increased to 17 ± 2.8 mV Hz after 5 minutes of CPR (dAMSA 10.5 ± 3.5 mV Hz).

42. PARAMEDICS PROVIDING PALLIATIVE CARE AT HOME: PATIENT AND FAMILY SATISFACTION

Alix Carter, Judah Goldstein, Marianne Arab, Michelle Marzetti, Stewart Mireille Lecours, Carolyn Villard, James Sullivan, Dalhousie University Category of Submission: OPERATIONS, QUALITY, SAFETY, SYSTEMS, DISASTER

Background: Paramedic crisis and symptom management for ongoing palliative care with the goal to treat in place repre-

sents a novel approach to care. A new clinical practice guideline, additional medications, and a money-based bundle of Essential Approaches to Palliative Care (LEAP) were developed for Paramedics were implemented in two provinces (AMSA) is a predictor of successful defibrillation (DF). In this study, we investigated the effect of high quality cardiopulmonary resuscitation (CPR) on AMSA in relationship with the duration of untreated ventricular fibrillation (VF) in a preclinical porcine model with a concurrent acute myocardial infarction.

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Alix Carter, Judah Goldstein, Marianne Arab, Michelle Marzetti, Stewart Mireille Lecours, Carolyn Villard, James Sullivan, Dalhousie University Category of Submission: OPERATIONS, QUALITY, SAFETY, SYSTEMS, DISASTER

Background: Paramedic crisis and symptom management for ongoing palliative care with the goal to treat in place repre-

sents a novel approach to care. A new clinical practice guideline, additional medications, and a money-based bundle of Essential Approaches to Palliative Care (LEAP) were developed for Paramedics were implemented in two provinces (AMSA) is a predictor of successful defibrillation (DF). In this study, we investigated the effect of high quality cardiopulmonary resuscitation (CPR) on AMSA in relationship with the duration of untreated ventricular fibrillation (VF) in a preclinical porcine model with a concurrent acute myocardial infarction.

Methods: An established model of myocardial infarction followed by VF was used. Forty-four pigs were subjected to different VF durations: 8–10 minutes (short), n = 14; 12 minutes (intermediate), n = 21; and 13–15 minutes (long), n = 9. Continuous mechanical CPR (Lucas, PhysioControl) with ventilation with oxygen and epinephrine administration (1 mg at 2 minutes of CPR) was performed for 5 minutes (short or intermediate) or 10 minutes prior to a VF arrest. Both VF and changes in AMSA during CPR (dAMSA) were evaluated, in relationship with the duration of untreated VF, coronary perfusion pressure (CPP), and epinephrine administration.

Results: Overall AMSA decreased from 13.7 ± 0.8 mV Hz to 6.5 ± 1.7 mV Hz during the 15 minutes VF (dAMSA −7.2 ± 2.5 mV Hz, p < 0.01), while it increased to 17 ± 2.8 mV Hz after 5 minutes of CPR (dAMSA 10.5 ± 3.5 mV Hz).

42. PARAMEDICS PROVIDING PALLIATIVE CARE AT HOME: PATIENT AND FAMILY SATISFACTION

Alix Carter, Judah Goldstein, Marianne Arab, Michelle Marzetti, Stewart Mireille Lecours, Carolyn Villard, James Sullivan, Dalhousie University Category of Submission: OPERATIONS, QUALITY, SAFETY, SYSTEMS, DISASTER

Background: Paramedic crisis and symptom management for ongoing palliative care with the goal to treat in place repre-
of untreated VF (dAMSA: 10.7 ± 1.7, 11.3 ± 1.5, and 13.6 ± 1.7 mVHZ for short, intermediate, and long VF duration, respectively, p = NS). AMSA during CPR was significantly correlated with CPR (r = 0.46, p < 0.01). AMSA increased significantly from the first to the second minute of CPR, as compared to the subsequent 2 minutes after epinephrine (dAMSA 6.2 ± 0.8 vs. 3.6 ± 0.6 mVHZ, p < 0.01). Interestingly, dAMSA improved similarly in the 3 VF duration groups during the first 2 minutes of CPR, but after epinephrine the magnitude of dAMSA continued to increase only when the duration of VF exceeded 3 minutes, while it decreased for shorter durations. Conclusions: High quality CPR allowed for AMSA increases independently of the duration of untreated VF. However, epinephrine administration further improved dAMSA only in the instance of longer durations of VF, while it seemed to have a detrimental effect for a shorter duration.

44. PREHOSPITAL EVIDENCE-BASED GUIDELINE IMPLEMENTATION METHODOLOGY: A SYSTEMATIC LITERATURE REVIEW

Jennifer Fishe, Remle Crowe, Rebecca Cash, Nikiah Nuell, Christian Martin-Gill, Christopher Richards

Background: As prehospital research advances, evidence-based guidelines (EBGs) are increasingly implemented into EMS practice. However, complete EBG implementation may hinder improvement in prehospital patient outcomes. To inform future EBG efforts, this study reviews and summarizes existing evidence pertaining to prehospital EBG implementation methodologies. Methods: This study is a systematic literature review followed by the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) methodology, PubMed®, EMBASE®, Scopus®, and Google Advanced SearchTM were searched without language or publication date filters. Results: Twenty-three articles were included. GRADE was applied to remaining articles independently by three of five members of the Prehospital Guidelines Consortium Research Committee. Variations in ratings were resolved by consensus. Study characteristics and salient findings are reported. Results: The systematic literature review produced 1,375 articles with 112 meeting inclusion criteria. Forty-six articles described EBG implementation (N = 24, 59%), or implementation barriers (N = 13, 32%). Common study designs were statement (N = 12, 29%), retrospective cohort studies (N = 12, 29%), and cross-sectional studies (N = 9, 22%). Using GRADE, evidence quality was rated low (N = 18, 44%), or very low (N = 7, 17%). Findings included: EBG adherence and patient outcomes depend upon successful implementation, (2) published studies generally lack detailed implementation methods, (3) implementation takes longer than planned (mostly for EMS education), (4) EMS systems’ heterogeneity affects implementation, and (5) multiple barriers limit successful EBG implementation (e.g., financial constraints, equipment purchasing, coordination with hospitals and regulatory agencies). The study found no direct evidence for best prehospital EBG implementation practices, including comparisons of implementation methods, or of methods in different contexts (e.g., urban versus rural, ALS versus BLS). Conclusions: While numerous implementation barriers are well described, there is a paucity of evidence for optimal prehospital EBG implementation methods.

45. ARE THERE DISPARITIES IN DISPATCH CPR INSTRUCTION RECEIPT AND CPR PERFORMANCE?

Amanda Amen, Patrick Karabon, Brian McNally, Cherie Bartram, Kevin Irwin, Kimberly Vellano, Robert Swor, Oakland University William Beaumont School of Medicine CATEGORY OF SUBMISSION: STUDENT, RESIDENT, FELLOW

Background: Dispatch-assisted cardiopulmonary resuscitation (DA-CPR) has been shown to improve rates of bystander CPR (BCPR), which enhances survival in Out of Hospital Cardiac Arrest (OHCA). Our objectives are to evaluate whether there are racial and socioeconomic disparities in receipt of DA-CPR instructions and subsequent CPR performance. Methods: We performed a retrospective review of the Cardiac Arrest Registry to Enhance Survival (CARES) dispatch registry from January 2014 to December 2016. Data was collected from a convenience sample of dispatch agency supervisor auditors of 9-1-1 OHCA audio recordings in one state. Elements related to dispatcher CPR instruction, and barriers to bystander CPR performance were recorded. Demographics including patient race (white, black, and other), sex, and event data were captured from the parent CARES database. These data were merged with census tract data regarding socioeconomic status (SES) of each incident location. The effects of race and SES were analyzed to determine their association with two outcome variables: caller receipt of DA-CPR instructions and subsequent performance of CPR. Multivariate logistic regression analysis was performed. Results: We identified 1,872 cases from 23 dispatch agencies with the presence of DA-CPR instructions and census tract data. The population was predominantly white (70.0%), male (66.0%), with an average age of 63.5 ± 18.7. DA-CPR instructions were more common in urban compared to rural incident areas. DA-CPR instruction was more common in private residence (ORadj = 3.8, 95% CI (2.5–5.8)) or in highest income quartile census tracts (ORadj = 1.65; 95% CI (1.01–2.72)). White race was associated with (ORadj = 0.99; 95% CI (0.98–0.99)) and black race (ORadj = 0.61; 95% CI (0.39–0.98)) were negatively associated with receipt of DA-CPR instructions. Subsequent performance of CPR after DA-CPR instruction was more common in witnessed arrests [OR 2.0, (95% CI 1.3–3.3)] and negatively associated with black race [ORadj: 0.31; 95% CI (0.16–0.58)]. The effect was smaller but different by socioeconomic or demographic characteristics. Conclusions: Although this preliminary study is limited by incomplete demographic and dispatch data, we identified racial disparities in provision of DA-CPR instructions and subsequent CPR performance. These findings varied minimally by SES or other demographic characteristics.

46. UTILIZATION OF EMERGENCY MEDICAL RESOURCES AT MASS GATHERING EVENTS AT AN URBAN UNIVERSITY WITH A COLLEGIATE-BASED EMERGENCY MEDICAL SERVICES AGENCY

Emma Ordway, Neil Sarna, Lindsey DeGeorge, Jose Nable, Georgetown University CATEGORY OF SUBMISSION: STUDENT, RESIDENT, FELLOW

Background: Mass gathering events (MGEs) challenge medical directors and emergency medical services (EMS) agencies with providing appropriate and sufficient medical resources. This study aimed to examine EMS resource utilization during MGEs at a medium-sized urban university with a collegiate-based basic life support (BLS) agency, and how such utilization may be associated with specific attributes of these events. Methods: All emergency medical dispatches for the studied on-campus EMS agency during MGEs were included for analysis in this retrospective study, covering MGEs from January 1, 2012 through September 1, 2016. This collegiate-based agency is the sole provider of medical standby details at its university. Environmental factors such as temperature, location (indoor vs outdoor), estimated event size, and event type were analyzed for each MGE based on data from standby duty logs and the National Weather Service. Linear regression, logistic regression and bivariate correlation were used to determine relationships between environmental factors and patients-per-event presentation rates (PPR) to EMS during these events. Results: No calls for service occurred for events with fewer than 500 attendees, while at least 1 call for service occurred at 6.1% of events with 500–1000 attendees and at 24.5% of events with over 1000 attendees. Notably, events, as compared to indoor non-sporting events, had an increased likelihood of calls for service (OR 4.4, p = 0.018). Outdoor sporting events, as compared to indoor sporting events, were also more likely to have requests for EMS (OR 6.1, p = 0.005). Conclusions: This study highlights that environmental features such as estimated crowd size, location, event type, and outdoor temperature can possibly be used to predict EMS resource utilization at MGEs. University administrators, event coordinators, and EMS agencies can potentially prepare medical plans for such mass gatherings by pre-assessing these event attributes.

47. SIMPLE FEEDBACK FORM IMPROVES QUALITY OF OUT-OF-HOSPITAL CPR

Ben Weston, Jamie Jasti, Melissa Mena, Jackson Unteriner, Kelly Tilston, Ziyian Yin, Mario Colella, Tom Auferheide, Medical College of Wisconsin CATEGORY OF SUBMISSION: OPERATIONS, QUALITY, SAFETY, SYSTEMS, DISASTER

Background: Despite medical advances and health awareness campaigns, the incidence of prehospital cardiac arrest remains high while survival rates remain low. Excellent prehospital care is tantamount to survival and high quality CPR is a vital contributor to positive outcomes. A quality improvement program was recently implemented to provide simple, goal based feedback to prehospital providers after each cardiac arrest resuscitation. Expanding upon an earlier preliminary study, we aim to assess whether the provision to dispatchers of a simple CPR feedback form led to improved quality metrics in out of hospital cardiac arrest resuscitations. Methods: This before and after retrospective review included 2 time periods, one with a quality improvement program in a mid-sized urban community with BLS and ALS providers. Two 9-month periods, one before and one after
the implementation of the form were evaluated. Metrics measured included the means and rates of first pass success for compression, rate, and fraction as well as preshock pause time. Results: A total of 439 before encounters and 621 after encounters were evaluated including 11 programs using ALS providers. Overall, significant differences were found in the mean compression depth (5.0 cm vs. 5.5 cm; p < 0.001), compression fraction (79.2% vs. 86.4%; p < 0.001), and preshock fraction rate (19.6% vs. 118.4/min; p < 0.001) and preshock pause time (18.8 sec vs. 11.8 sec; p < 0.001). Additionally, improvements were noted in goal achievement for all metrics (48.5% vs. 66.7%; p < 0.001), compression fraction (68.1% vs. 91.0%; p < 0.001), and preshock pause time (24.1% vs. 59.5%; p < 0.001). No significant difference was found in goal achievement of compression rate.

Conclusions: We found that the introduction of a simple CPR feedback form to prehospital providers was associated with improvement in prehospital CPR quality.

48. CUMULATIVE SUCCESS OF PREHOSPITAL ADVANCED AIRWAY MANAGEMENT IN A NATIONAL COHORT

Jeffrey Jarvis, Dustin Barton, Henry Wang. Williamson County EMS

Background: Repeated attempts at Advanced Airway Management (AAM) are associated with increased risk of adverse events. There are few current descriptions of the number of attempts needed for success. We sought to characterize cumulative AAM success rates in a national cohort of Emergency Medical Services (EMS) agencies. Methods: We used 9 years of data from ESO Solutions, a national EMS electronic health record system. We included all encounters with attempted AAM. We examined the number of attempts needed for success, and the number of attempts needed to reach OS. Results: A total of 61,793 patients from 552 EMS agencies underwent AAM. Of these, 3,095 RSI, 7,229 NA-ETI, 19,138 CA-ETI, and 5,993 SGA. NA-ETI, 19,138 CA-ETI, and 5,993 SGA.

The number of AAM attempts per patient varied (median 1, range 1–10). CA-ETI performance was: FPS 71.4% (95% CI 70.3–72.5), 4 attempts to reach the OS threshold of 91.7% (91.4–92.1). NA-ETI performance was: FPS 66.3% (95% CI 65.4–67.2%), 3 attempts to reach the OS threshold of 90.4% (95–91.1%). SAI performance was: FPS 75.9% (95% CI 74.9–76.9%).

Conclusions: These are the first benchmark data drawn from a large, national dataset against the EMS Compass measures. These results provide a starting point for quality improvement efforts and support areas for improvement in pediatric care. Only 55% of children had documented weights which are needed for correct dosing and only 83% of hypoxic asthmatics received a beta-agonist. This highlights opportunities for improvement.

50. AEDS ON WHEELS: A PILOT PROGRAMME TO EQUIP TAXIS WITH AEDS

Alexander White, Desmond Mao, Vernon Kang, Marcus Ong. Singapore General Hospital

Background: We aimed to determine the feasibility of improving AED utilization rates and time-to-first-shock times by equipping taxis with AEDs. This is a prospective observational feasibility study conducted in Singapore, a densely populated Southeast Asian nation with 5.54 million people on a land area of 721 square kilometres. There are 3,300 licensed SMRT taxis in Singapore. 155 drivers of the SMRT taxi company were recruited, trained and certified in CPR-AED skills. They were then assigned to 100 taxis equipped with AEDs and displaying AED decals on taxis’ windows and interior. A phone app alerted drivers to cardiac arrest cases prior to ambulance arrival. From SMRT taxis, 155 drivers were recruited, trained and certified in CPR-AED skills. They were then assigned to 100 taxis equipped with AEDs and displaying AED decals on taxis’ windows and interior. A phone app alerted drivers to cardiac arrest cases prior to ambulance arrival. Upon arrival, the drivers either provided AED to lay bystanders on scene or applied it themselves. If paramedics arrived at the scene first, taxis would be notified to stand down. Post-incident, drivers were required to document incident and submit AED for check-up and maintenance. Results: From November 2016 to April 2017, more than 2,480 activations were sent to a total of 71 drivers. A total of 24 taxi drivers accepted 192 alerts to mobilize. Of these mobilizations, 22 taxi drivers arrived at scene before the ambulance. A total of 24 taxi drivers accepted 192 alerts to mobilize. Of these mobilizations, 22 taxi drivers arrived at scene before the ambulance. The mean time of activation-to-arrival at the scene was 6.01 minutes (95% CI 5.24–6.78). Where the taxi arrived at scene, the average distance from call to taxi was 763 meters (95% CI 654–871). Taxis that were closer to the incident had a higher likelihood of arriving before the ambulance (763 meters vs. 955 meters, P-value = 0.004). A total of 10 drivers were “Super Responders” as they had arrived at the scene three times or more. Conclusions: This is a prospective feasibility study with the SMRT company actively participating. We hope to develop an essential skill among the EM population. This model of mobilizing AEDs has a high likelihood of utilization, increases the reach of AEDs, and improves time-to-first-shock times. These are important components of successful PAD.

51. MEDICAL COMMAND TRAINING FOR EMERGENCY MEDICINE RESIDENTS: AN OVERVIEW OF MEDICAL COMMAND EDUCATION, OVERSIGHT, AND EVALUATION

Abagaye Renko, Nicholas Julius, Chadd Nesbit, Penn State Milton S. Hershey Medical Center

Background: Training Emergency Medicine (EM) residents provide medical oversight as a requirement for EM residency accreditation through the ACGME; yet, no standard curriculum from which to train these residents on this essential skill exists and literature describing the current state of resident medical command training is limited. We sought to assess the state of medical command training in EM residency programs. Methods: A thirty question survey was created and distributed electronically through email by the Research Electronic Data Capture (REDCap) program. The survey contained questions regarding demographics, general facility and program descriptors, medical command training procedures, personnel providing oversight and feedback. Descriptive statistics were collected and analyzed using chi-squared tests for categorical variables. Results: A total of 109 surveys were completed (54.5% response rate), and 96 of those programs (88.1%) reported that their residents receive formal medical command training. A majority of those programs begin medical command training during their residents’ first (42 programs, 43.8%) or second (40 programs, 41.7%) year of residency. Most programs do not have required formal classroom-based (57 programs, 57.7%) or online-based (75 programs, 77.7%) training. EM physicians are the primary individuals providing training (91 programs, 93.8%). Most programs allow their residents to begin giving medical command in their second year of residency (52 programs, 54.7%). A majority of programs do not have a system in place to track how many medical command calls their residents take (63 programs, 66.3%), nor do they assign dedicated medical command shifts to their residents (85 programs, 89.5%). Most programs allow their residents to issue medical command orders without the presence of an attending physician (62 programs, 65.3%). A majority of programs indicated that their residents are provided feedback on their performance for their command call management (83 programs, 85.6%) and most programs indicated that medical command calls by residents are reviewed regularly (85 programs, 85.6%). Conclusions: Most EM residency train their residents in providing medical command, yet there is a wide variation in the approach and standard of care which has not been comprehensively addressed. Further research and analysis are required to make recommendations for a more uniform system of resident command training.

52. Near Misses in a Two-Tiered Suburban EMS SYSTEM: A DESCRIPTIVE STUDY ON DOWN-TRIAGED PATIENTS WHO ARE TAKEN
Emergently to the Operating Room or Admitted to Intensive Care Units

Joslyn Joseph, Joshua Bucher, David Feldman, Albert Ritter, Frederick Fiesseiler, Morrision Medical Center Category of Submission: OPERATIVE CARE, QUALITY, SAFETY, SYSTEMS, DISASTER

Background: A two-tiered EMS system has the advantage of incorporating volunteer, public, and private BLS ambulances into the system to decrease response times and spread resources further. An ALS unit who responds to a scene may down-triage or “release” to BLS if no ALS interventions are warranted outside of BLS scope of practice to allow their unit to stay in service. As a result, there have been no studies to evaluate the characteristics of high-risk patients “released” to BLS and then taken to the Operating Room (OR) or admitted to the Intensive Care Unit (ICU). In this study, we sought to describe this “near-miss” population of patients who were ultimately deemed to be critically ill by Emergency Departments and had the potential to decompress quickly.

Methods: Setting: A suburban two-tiered EMS system in which ALS units evaluate approximately 14,000 patients per year. All patients from 2007–2014 were identified via chart review and 95% Confidence Intervals (CIs) calculated when appropriate. Results: Out of 17,639 patients from 2007–2014 who were evaluated by ALS and triaged to BLS, 372 were ultimately deemed to be critically ill by Emergency Departments and had potential to decompress quickly. The average age of patients was 66.4 years (61.0–71.7) and 52% were female. The most common misatriaged final diagnosis category was Neurological, 24% CI (23.3–24.7), followed by GI/Abdominal Emergencies 15% (14.3–15.7%). Sepsis was misatriaged 10.2% CI (9.5–10.9) of the time, and 9 patients, 2.4% CI (2.3–2.6) were taken emergently to the Cardiac Catheterization Lab. Conclusions: This is the first step to investigate this phenomenon unique to two-tiered EMS systems. From our study, we can conclude that prehospital screening is needed to recognize prehospital Neurological and Abdominal/GI Emergencies to avoid near misses in the future. More research is also needed to determine if this additional strategy had poor outcomes as a result of being misatriaged to make triage protocols safer for our patients.

53. ASTRATING: RATES OF SUICIDALITY IN EMS PROVIDERS: A HIDDEN EPIDEMIC

Al Lulla, Jyotirmoy Das, Ghady Rahhal, Rebecca Dougherty, Bridgette Svanarek, Washington University in St. Louis Category of Submission: STUDENT, RESIDENT, FELLOW

Background: EMS providers experience severe workload stressors that increases their risk of suicidal ideation. Past suicidal thoughts and attempts have been established as placing individuals at high risk for future suicidal behavior. We sought to review the severity of the persistence of suicidality in EMS providers and to identify potential factors that place individuals at higher risk.

Methods: We administered a 19 item suicide risk assessment questionnaire to a random sample of 16 EMS agencies and 1,688 EMS providers. In order to assess for suicidality, the Suicide Behaviors Questionnaire Revised (SBQ-R) was utilized. SBQ-R consists of Likert scaled responses to questions regarding suicidal ideation using a Likert scale. These 4 dimensions are (1) lifetime suicidal ideation and/or suicide attempt, (2) frequency of suicidal ideation over past 12 months, (3) threat of suicide attempt, and (4) likelihood of future suicidal behavior. In prior studies, a SBQ-R score of 7 or greater has been validated as a lower valid predictor of suicidal behavior. The SBQ-R score has previously demonstrated ability to identify individuals at risk for suicide with 93% specificity and 95% sensitivity. To test in our study, we utilized a square to determine the relationship between suicidality and gender, age, shift-lengths, hours worked per week, years in EMS, race, practice setting, service type, level of suicide, and knowing an EMS provider who committed suicide.

Results: We received 289 completed surveys analyzed less than 2 weeks after survey distribution. 30.8% in their Li.

PREHOSPITAL EMERGENCY CARE XXXXX 2017 V OLUME 0/N UMBER 0

54. IDENTIFICATION OF SEPSIS IN THE PREHOSPITAL SETTING: AN OBSERVATIONAL STUDY OF PARAMEDIC SEPSIS SCREENING STRATEGIES

Daniel Lane, Ian Blanchard, Gerald Lazarenko, Laurie Morrison, Steve Lin, Hannah Wunsch, Sheldon Cheskes, Refik Saskin, Damon Scales, Institute of Health Policy, Management and Evaluation, University of Toronto Category of Submission: STUDENT, RESIDENT, FELLOW

Background: Sepsis is a life-threatening syndrome where earlier recognition and prompt intervention is critical to improving outcomes. In modern healthcare systems, paramedics encounter many sepsis patients first, offering an opportunity for earlier detection. The purpose of this study was to provide the incidence of paramedic reported suspicion of infection, and to compare the accuracy of published paramedic screening strategies for sepsis within the Canadian Prehospital Onscene System (CAD) and EMS Clinical Information. The incidence of paramedic documented suspicion of infection in patients diagnosed with sepsis in the ED, and the sensitivity, specificity, positive, and negative likelihood ratios (LR) for each of the screening strategies, using the recommended score threshold as originally published where applicable are reported.

Results: Paramedics documented suspicion of infection in 350 of 2,715 [13% (95% Confidence Interval 2–14%)] sepsis patients. Twelve paramedic screening strategies were used in the past year. The highest sensitivities were identified in the literature. The PRESS, HEWS (score of = 2), and Robson scores had the highest sensitivities [0.980(0.98–0.99), 0.870(0.86–0.88), 0.746(0.73–0.76)] and lowest negative LR [0.080(0.04–0.08), 0.27(0.24–0.30), and 0.39(0.37–0.42), respectively] for ruling out sepsis. The PSP score (high risk) and Sepsis Alert strategies had high specificity [0.980(0.98–0.98) and 0.990(0.99–1.0)] and positive LR [19(17–22) and 13.6(11.6–16.0)] for ruling in sepsis. Sensitivity was 0.27(0.24–0.30) and 0.07(0.06–0.08), respectively. Comparing the qSOFA score recommended in the Sepsis-3 definition to the previously recommended SIRS score, qSOFA was better for ruling in sepsis, with positive LR 9.1(8.5–9.7) vs. 7.2(6.5–8.5), while SIRS was better for ruling out sepsis [negative LR 0.67(0.65–0.70) vs. 0.74(0.72–0.75)]. Conclusion: Paramedics had low rates of documented suspicion of infection in sepsis patients. Paramedic screening strategies may help to identify sepsis, but the choice of strategy will depend on whether the goal is to correctly rule out versus rule in these diagnostically.
Background: Previous studies in a small, suburban town showed that more than half of elders who fall and require lift assists will activate the 9-1-1 system again within 30 days. Community-based interventions involving paramedics, visiting nurses, and primary care providers substantially reduced the frequency of repeat EMS and lift assist calls. This study was designed to evaluate these findings across larger, more diverse populations of elders at risk for falls.

Methods: For this non-randomized, prospective study, informed consent to follow subsequent calls for utilization was obtained from 2,265 participants residing in AMR’s regional response areas. Participants chose to have no intervention, or the interventions that included sequential home visits by a research paramedic evaluating disability and home safety, a visiting nurse assessing for home health care requirements and eligibility, or an offer of free transportation for a primary care provider visit. Participants were enrolled during (1) an EMS call during 30 or 90 days following enrollment (nonintervention group), or completion of the intervention, using a generalized estimating equation approach, in SAS. Results: As of May 31, 2017, 980 nonintervention group participants completed >30 days of follow up, and 652 completed >90 days, vs. 1,285 intervention group participants completing >30 days, and 980 completing >90 days. The intervention group showed a 51% reduction, and at 90 days, a 38% reduction in the proportion of participants with at least one EMS call during the 30 or 90 days following enrollment (nonintervention group), or completion of the intervention, using a generalized estimating equation approach, in SAS. Results: As of May 31, 2017, 980 nonintervention group participants completed >30 days of follow up, and 652 completed >90 days, vs. 1,285 intervention group participants completing >30 days, and 980 completing >90 days. The intervention group showed a 51% reduction, and at 90 days, a 38% reduction in the proportion of participants with at least one EMS response (both p < 0.001), compared with nonintervention. ED enrollees benefitted most, with a 45% reduction in EMS utilization at 30 days (p < 0.001), and a 25% reduction at 90 days (p = 0.009).

Conclusions: This study demonstrates short-term effectiveness of our multidisciplinary community health care interventions at reducing EMS utilization. The data strongly suggest that metrics the group that was most disabled at baseline, appeared to benefit the most from the interventions.

57. Effect of Sodium Bicarbonate Administration During Out-of-Hospital Cardiac Arrests on End-Tidal CO2 Readings: Is Considering Termination of Resuscitation

Brandon Morshed, Alysha Joseph, Ray Fowler, University of Texas – Southwestern Category of Submission: Cardiac

Background: The administration of sodium bicarbonate (NaHCO3) during out-of-hospital cardiac arrests (OHCA) has been shown to produce post-resuscitation electrical activity that is not a true indicator of brain function. The decision to stop resuscitation (TOR) in the out-of-hospital environment is often made by the provider. The Provider Impression was “Cardiac Arrest.” The records were individually examined to determine the EtCO2 readings and whether these patients received NaHCO3. Results: A total of 182 OHCA cases were selected which had a documented EtCO2, with 93 receiving NaHCO3 and 89 not receiving NaHCO3. The results were analyzed using a Welch’s t-test. A significant difference was found in EtCO2 readings between the two groups, with a mean EtCO2 of 26 mmHg in the NaHCO3 group and a mean of 19.7 mmHg in the non-NaHCO3 group, with a p-value of 0.026. A subgroup analysis showed that when comparing the 50 highest EtCO2 readings, the difference was even greater, with a mean of 39.9 mmHg in the NaHCO3 group and 27.7 mmHg in the non-NaHCO3 group, with a p-value of 0.0018. When the EtCO2 readings were below 20 mmHg, there was no significant difference.

Conclusions: There are no widely accepted guidelines for the technique of TOR in OHCA patients. The value of employing EtCO2 readings in this year. This study indicates that administering NaHCO3 during OHCA will significantly elevate the EtCO2, and NaHCO3 administration complicates the utility of EtCO2 readings. Future studies are needed to determine the use of EtCO2 in TOR decisions is necessary.

58. Feasibility of Recording Out-of-Hospital Cardiac Arrest Treatment Via Use of a Mobile Smartphone Application


Background: Given the demanding nature of out-of-hospital cardiac arrest (OHCA) resuscitations, recordings of the times of interventions in EMS patient care reports (PCRs) are often inaccurate. The American Heart Association developed Full Code Pro (FCP), a smartphone application designed to assist providers in recording the timing of interventions performed. Through OHCA simulations, this study assessed the group size necessary to use the FCP recording functions accurately and safely without compromising patient care. Program evaluation was based on participant feedback surveys, data accuracy, delays between recording and performing interventions, and delays in care attribution and documentation, stratified by group size. Methods: Simulations of a standard OHCA scenario using the Gau-

59. Influence of Neighborhood Socioeconomic Status on Quality of Prehospital Care for Ischemic Stroke


Background: A minimal amount is known regarding the effect of neighborhood socioeconomic status (nSES) on emergency medical services (EMS) use and quality of prehospital care among stroke patients. Methods: A retrospective cohort study was performed using the Get With The Guidelines-Stroke registry at two hospitals to identify patients with a hospital diagnosis of ischemic stroke between 2012 and 2016. Registry data were merged with data from EMS medical records and the United States Census Bureau. Patient addresses were geocoded and a one-block radius was created around each patient’s address to represent their neighborhood. Census data from each buffer were used to create a composite nSES score, which was categorized into quartiles. Multivariable log-binomial regression models assessed the associations between nSES and 1) EMS use, and 2) decision delay time to calling 9-1-1. Among EMS patients, we also assessed associations between nSES and 1) dispatch EMS level of care, (2) EMS response time, (3) EMS on-scene time, (4) Cincinnati Prehospital Stroke Scale (CPSS) at EMS on-scene, and (5) hospital prenotification by EMS. Results: Of 1,472 patients, 48% were aged 50–74 years, 50% were female, 73% were white, and 59% used EMS. Compared with patients in the highest nSES quartile, patients in the lowest nSES quartile were 20% less likely to use EMS (risk ratio (RR): 0.80; 95% confidence interval (CI): 0.67, 0.95). EMS providers performed the CPSS on 65% of patients. Patients of lower nSES were less likely to have a CPSS performed: risk ratios, compared with the highest nSES quartile, were 1.72 (95% CI: 1.14, 2.50), 2.91 (95% CI: 2.00, 4.21), and 3.39 (95% CI: 2.30, 4.99) for nSES quartiles 2, 3, and 4 (lowest nSES), respectively. nSES was significantly associated with other outcomes. Conclusions: Among a sam-ple of ischemic stroke patients, 41% did not use EMS and those of lower nSES used EMS more frequently. EMS providers performed the CPSS assessment less frequently on patients of lower nSES. Understanding reasons for these observations is vital to improving the quality of prehospital stroke care.
Background: Paroxysmal supraventricular tachycardia (PSVT) is a common group of arrhythmias that Advanced Care Paramedics (ACPs) can often identify with vagal maneuvers, adenosine, and/or cardioversion, provided that they correctly identify the rhythm. The study objective is to determine the accuracy of ACP identification of PSVT.

Methods: Following ethics approval, all calls with patients ≥18 years with a 12-lead ECG available were reviewed by ACPs within a region of western Ontario between July 2015 and December 2015 and had a documented heart rate >150 bpm, were included. Paramedic call reports were retrospectively reviewed for study data, including documentation of ACP identified PSVT. The reference standard was consensus between a fellow and prehospital physician who adjudicated each ECG for the presence of PSVT in a blinded, independent fashion. In the event of a disagreement, a third, blinded prehospital physician was used for resolution. Of the 442 patients included, 197 (45%) were male and the median age [Interquartile range (IQR)] was 70.0 years (58.0–82.6). ACPs identified 74 (16.7%) patients as having PSVT, 48.5% had a history of previous arrhythmia, compared to 31.9% of patients with no ACP identified PSVT (p = 0.026). They were also significantly younger [median(IQR) = 65.0 (47.0–75.0)] compared to those without ACP identified PSVT [median(IQR) = 72.0 (61.0–85.0)] (P < 0.0001). Sensitivity of ACP identified PSVT was 98.6% (95%CI:97.8–99.3%) and specificity was 90.6% (95%CI:87.3–93.3%). The positive predictive value (PV) of ACP identified PSVT was 97.3% (95%CI:85.8–99.9%) and negative predictive value (NPV) was 90.6% (95%CI:87.3–93.3%). The positive likelihood ratio (LR) was 10.4 and the negative LR was 0.03. Moderate inter-rater agreement was scored that correctly identified the rhythm.

Conclusions: These results indicate that ACPs are adept at identifying PSVT, but are prone to false positives. ACPs have relatively good sensitivity and specificity seen in this investigation, future studies should investigate ACP recognition of specific rare arrhythmias (antidromic accelerated atrioventricular tachycardia) that may require different management including avoidance of adenosine.

61. POLICE DEPARTMENT TACTICAL MEDICINE (TACMED) PROGRAM IMPACT ON TRAUMA PATIENT MORTALITY: REVIEW OF A LARGE URBAN EMS AND TACMED SYSTEM

Elliot Ross, David Wampler, Avery Kester, Xandria Gutierrez, Crystal Perez, Laura Rensen, Alejandra Mora, Joseph Maddry, Craig Manifold, San Antonio Uniformed Services Health Education Consortium Category of Submission: STUDENT, RESIDENT, FELLOW

Background: Tactical Emergency Medical Services (TACMED) is a growing subspecialty of emergency medicine. ACPs are ideally suited to provide care at the point of injury in areas traditional EMS cannot enter. A minimal amount is currently known regarding the clinical impact of TACMED programs. This study examines patient outcomes of those treated by a Police based TACMED system vs. traditional EMS.

Methods: A case-match study was performed that compared trauma patients where police were dispatched and EMS was staged and were then transferred to a Level 1 trauma hospital. All patients that died at the scene or en route were excluded. The computer automateddispatch (CAD) system was used to identify all cases from 2011–2015. The TEMS data management database for the meeting, inclusion criteria were extracted. Demographics, injury description, prehospital index (PHI) scores, disposition, and interventions were collected. Hospital disposition and outcome data were linked using the regional trauma registry. Using gender, injury year/age, type, and ISS a case-match controlled comparison between EMS and TEMS records (2:1) was conducted. Chi-square (or Fisher’s Exact) test for categorical and t-test (or Wilcoxon) for continuous variables.

Results: Of the 122,707 CAD events, only 2,243 met inclusion criteria. Seventy TEMS records and 140 EMS case matched controls were included. Majority were male (90%) civilians (99%) with a median age of 31. Sixty percent of patients were injured secondary to a shooting, 30% stabbing, and 10% assault. Moderate to severe bleeding was encountered in 75% of patients, and 46% sustained major trauma (PHI ≥ 4). TEMS providers had a shorter response time compared to EMS providers; 6 vs. 13 minutes, p < 0.0001. Cohorts had similar PHI scores and intervention performance rates. However, trauma system and hospital resource utilization were comparable. Both had similar number of ventilator, ICU, and hospital days. There was no difference in mortality rates. Our study setup, the TEMS providers exhibited shorter response times and performed medical interventions at similar rates to traditional EMS. Although no differences in hospital disposition were noted, all patients who died prior to hospital arrival were excluded. Future studies are needed to determine how response time impacts the rate of preventable death.

62. OPTIMIZING DEPLOYMENT OF MECHANICAL CPR DOES NOT IMPROVE OHCA OUTCOMES WHEN COMPARED WITH MANUAL CPR

Brandon Oyler, Louis Gonzales, Jeff Hayes, Mark Escott, Jose Cabanas, Paul Hinchey, Lawrence Brown, Dell Medical School at the University of Texas Category of Submission: CARDIAC

Background: Deploying mechanical CPR in out-of-hospital cardiac arrest (OHCA) is logistically challenging. Inefficient deployment might explain reports of poor OHCA outcomes associated with mechanical CPR. We hypothesized that in an EMS system with optimized deployment, sustained ROSC to discharge will not differ for OHCA patients managed with and without mechanical CPR.

Methods: In 2015, we initiated a quality improvement initiative and optimized deployment of mechanical CPR. All primary first response agency (attending ≥75% of OHCA’s) field personnel attended in-person training and practical exercises emphasizing high quality traditional CPR, timely defibrillation, airway management / ventilatory support and first-round medication administration before initiating mechanical CPR. We then analyzed all adults, non-traumatic OHCA attended by the first response agency during 2016. During the study period, mechanical CPR devices were deployed on some—but not all—first response units; use of mechanical CPR was based primarily on availability and/or whether patients achieved ROSC after initial resuscitation attempts. To control for propensity score matching to select cases with and without mechanical CPR that had similar patient demographics and arrest characteristics. We excluded OHCA’s without ROSC follow- ing only CPR or defibrillation without medication administration, terminations of resuscitation without meaningful resuscitation attempts (including DNRS), and EMS-witnessed arrests.

All prehospital data were obtained from the EMS electronic health record; hospital outcomes were obtained from the hospital’s EMR. Results: Of 444 eligible OHCA’s, 227 received mechanical and 217 received traditional CPR. Crude ROSC (29.1% vs. 39.2%) and survival to hospital discharge (5.7% vs. 13.8%) were no different with mechanical CPR, but mechanical CPR cases were also less likely to be witness arrests and less likely to present with a shockable rhythm. In the propensity-matched analysis of 187 patients with mechanical CPR well-matched to 187 patients with traditional CPR, both ROSC (29.2% vs. 39.5%; difference: −10.3%; CI: −0.7% to −19.9%) and survival to discharge (7.0% vs. 14.1%; difference: −7.1%; CI: −0.9% to −13.1%) remained significantly lower for patients receiving mechanical CPR. Conclusions: In an EMS system with optimized deployment, mechanical CPR was associated with decreased ROSC and decreased survival to discharge.

63. GENDER DISPARITIES IN THE PREHOSPITAL SETTING AMONG KNOWN ST-SEGMENT ELEVATION MYOCARDIAL INFARCTION PATIENTS

Krystal Baciak, Stephen Sanko, Mark Eckstein, University Of Southern California Los Angeles County And University Of Southern California Category of Submission: STUDENT, RESIDENT, FELLOW

Background: Identification of a ST elevation myocardial infarction (STEMI) in the prehospital setting has been shown to decrease door-to-balloon time and mortality. Up to 20% of STEMI patients do not present with typical symptoms and gender disparities exist in the prehospital setting in the assessment of patients ultimately found to have ACS. Our hypothesis is women are more likely to have delayed STEMI care than men. Methods: This is a retrospective cohort study of 9–1–1 patients who were transported by a single large urban EMS provider to STEMI-Receiving Centers (SRC) from January 2011 to December 2015 and were diagnosed with a STEMI, had emergent PCI, and were found to have a culprit coronary artery obstruction. Our primary outcome was EKG-to-balloon time (EB). Our exclusion criteria were: interfacility transfer, age under 16, inability to calculate E2B and STEMI patients with witnessed arrests. Our secondary outcomes were: time intervals from 9–1–1 call through device time. Results: Of the 2,778 patients eligible for analysis, 2,148 patients were included in final analysis after application of the exclusion criteria. Women had longer on-scene times, longer times from 9–1–1 call to arrival at the SRC, time from first medical contact (FM) to balloon, and time from 9–1–1 call to EKG (P < 0.001). Time from first medical contact to cath lab arrival was longer in women, but did not reach statistical significance (P < 0.002) using a very conservative Bonferroni-corrected p-value. There were no statistically significant differences in whether or not a prehospital EKG was performed or transmitted, whether a prehospital EKG indicating STEMI was noted, whether or not aspirin was given, transport time from EKG to cath lab, or door-to-balloon (p > 0.01). Conclusions: Our study demonstrates women are more likely to have delayed times from 9–1–1 call to hospital arrival, FM to balloon, and time from 9–1–1 call to EKG, but do not have a difference in E2B or door-to-balloon time. Limitations include short transport times, a single urban EMS service, and the retrospective nature of the study.
Background: Improving EMS systems of care requires a better understanding of out-of-hospital refusals of care. There is a paucity of data on EMS refusals of care. Studies over the past three decades have shown widely varying results on the characteristics, demographics, and rates of EMS refusals of care. The purpose of this study is to analyze, at the state level, the characteristics, demographics, and rates of EMS refusals of care to provide a platform for identifying targets to help improve EMS systems of care.

Methods: Delaware statewide EMS data for all refusals and transports were queried for the calendar year of 2016. Age, gender, dispatch reason, time of year, and location were aggregated and retrospectively analyzed through descriptive statistics and multi-variate logistic regression. Results: Of the 155,303 EMS incidents, 12,244 (7.9%) resulted in refusals of care. Patients 65 years and older had a smaller percentage of refusals than adults 18–64 years old and children <18 years old (6.4% vs. 8.8% vs. 9.6%, p < 0.001). The highest percentage of refusals occurred during mid-summer (8.8%, p < 0.001). Locations of care which include places of recreation and bodies of water had the highest refusal rates (45.6% vs. p < 0.001). Conclusions: In this population, geriatric patients had lower refusal proportions; whereas, prior studies suggested that geriatric refusals are greater than other age groups. The greater refusal rate among men is consistent with previous literature. Prior studies have shown the highest rates of refusals for vehicle-related and other trauma calls, however, diabetes-related problems comprised the highest percentage of refusals in this population. Mid-summer time of year and places of recreation also comprised high percentages of refusals and further investigation is necessary to identify root causes of these patterns.

65. Feasibility of Point-of-Care Ultrasound (POCUS) in Out-of-Hospital Cardiac Arrest (OHCA) by Novice Ultrasonographers

James Fitzgerald, Emily Lovalo, Marek Radomska, Jeremiah Escaeda, Christian Martin-Gill, Department of Emergency Medicine, University of Pittsburgh School of Medicine Category of Submission: Cardiac Arrest: Prehospital Care

Background: Point-of-care ultrasound (POCUS) may be a useful tool to predict survival and guide interventions in out-of-hospital cardiac arrest (OHCA), yet a paucity of data exists on itsprehospital use by users with limited ultrasound experience. We aimed to determine the feasibility of using POCUS during OHCA by resident and fellow physicians staffing a 24/7 prehospital response vehicle and identify barriers, with expert interpretation. Several avoidable factors for not using POCUS included return of circulation soon or before arrival, prioritizing interventions, provider preference, not having the ultrasound device, mechanical failure, and cessation of resuscitation per advanced directives. Conclusions: Use of POCUS by novice prehospital physician ultrasonographers to detect wall motion in OHCA is feasible and correlates with expert interpretation. Several avoidable barriers to the use of prehospital POCUS may be addressed through additional educational interventions and increased familiarity with the device.

66. Air Versus Ground Transfer to Comprehensive Stroke Center in Patients with Large Vessel Occlusion Stroke

Ali Shams, Chris Kanaan, Rebbecca Grysiewicz, Chris Kazmierczak, Laura Steucher, Robert Swor, Beaumont Health Category of Submission: Student, Resident, Fellow

Background: Optimal treatment ischemic stroke caused by a large vessel occlusion (LVO) involves timely transfer from a primary stroke center to a comprehensive stroke center (CSC) that can offer mechanical endovascular therapy. Transfers are either done via air or ground, however data have not shown a clear benefit of one method of transfer over the other. The objective of this study was to compare air vs ground transfer times from decision to transfer to definitive care in patients with LVO strokes transferred to a single CSC. Methods: This is a cohort study and transferred to a single suburban CSC (January 2015–December 2016) from seven primary stroke centers within a 15-mile radius with the diagnosis of LVO stroke. Key outcome variables were air or ground transport, time, time from decision to transfer (access to sending hospital ER allowed characterization of this time point), and time intervals from arrival to first ED evaluation, interventional skin puncture (access) and reperfusion at the CSC were recorded. Non-parametric statistics were used for comparisons. Median and range are reported. Results: There were 30 inter-hospital transfers from within a 15-mile radius. Of these 16 were by air and 14 were ground transfers. Air transport times were significantly shorter (16.5 ± 30.0 minutes, p = 0.013). There was no difference between transfer decision-CSC ED arrival between air and ground (65.3 vs. 67.5 minutes, p = 0.967, respectively). Conclusions: Consideration of the optimal method for inter-hospital transfer of critical patients.

67. Patient Preferences toward Emergency Medical System Provider Attire

Jesse Olsen, Lubin Jeffrey, Haked Iskandarani, Penn State College of Medicine Category of Submission: Operations, Quality, Safety, Systems, Disaster

Background: In a health-care landscape driven by patient satisfaction and quality assurance, preferences towards provider attire has become a topic of interest. Uniforms afford essential visual clues for personnel identification; recent research demonstrates different patient preferences for both nurses and physicians in emergency settings. In emergency medical systems, teams rely on trust for effective and successful responses. In the context of EMS personnel, no studies have addressed patient perception of attire. This prospective study addresses how EMS attire influences patient perception of care through five different variables: likeability, trust, confidence, willingness to confide, and intelligence. Methods: Over six weeks in the Emergency Medical Systems of Care, the authors conducted 165 surveys completed evaluating a team of two EMS providers. Participants surveyed viewed one of three two-minute videos of an EMS team responding either to the worst possible scenarios, or to a routine transport. In each video EMS personnel wore a distinct outfit: a blue tee shirt, a white button-up shirt or turnout gear. Participants subsequently completed a six question survey addressing preferences on a 5-point Likert scale. Attires were compared using a two tailed Kruskal-Wallis test, a non-parametric equivalent of an ANOVA. Results: Of 165 surveys completed, 87.5% of responders rated EMS attire as important. No differences in responses were found related to patient age, gender or ethnicity. Analysis of the likert data, showed no significant differences with respect to perceived provider trust, smartness, likability or confidence. However, participants answered significantly lower on the Likert scale for willingness to discuss confidential information with the providers in the turnover gear compared to the other two attires at an alpha of .0057. Conclusions: Based on our results, EMS providers that use turnover attire impact patient perceived quality of care. Lower responses were found for turnover attire, possibly from a lack of association of EMS providers with the gear. Study limitations include a small sample, and those that analyze more outfits or aspects of provider appearance would lend support to this conclusion. Our study was small, limited by length of the videos, and number of outfits tested but our results conclude attire as a minor factor in EMS responses.

68. Multivariable Analysis of Factors Associated with EMS Non-transports

Rickquel Tripp, Jonathan Elmer, Francis Guyette, Christian Martin-Gill, Department of Emergency Medicine, University of Pittsburgh School of Medicine Category of Submission: Operations, Quality, Safety, Systems, Disaster

Background: Emergency response without transport confers a risk of negative patient outcomes, increases liability, and non-payment. Not all non-transport responses are negative risk factors for non-transports. We aimed to identify demographic and clinical characteristics predictive of non-transports using a large database of out-of-hospital EMS responses from a single state. We retrospectively reviewed consecutive patient care records from 21 urban, suburban, and rural EMS agencies in Western Pennsylvania from April 2013 to December 2016. Using a predefined patient risk factors, gender, race, ethnicity, level of transport,
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Lehmann’s median difference.

The frequency of patients with inferior STEMI was compared to defined as a triage SBP less than 100 mmHg, in excluded. Inferior STEMI was defined as ST-sis of STEMI treated with NTG were included. Patients with hypotension on EMS arrival were those who were unsuccessful on the examination are close to the passing standard (maximum length testers) and would be likely to retest. Method: National EMT Certification cognitive examination results for graduates of non-military EMT education programs from the class of 2013 were analyzed as a cross-sectional evaluation. The computer adaptive test terminates when the 95% confidence interval surrounding the estimate of the candidate’s ability is entirely above or below the passing standard. Test length ranged from 70 to 200 questions. Unsuccessful testers were defined as candidates who had a grade of fail or incomplete (did not finish the examination) on their first examination attempt. Chi-square tests were used to compare demographics of candidates and to assess for differences in retesting between minimum and maximum length testers. Results: A total of 59,560 EMT graduates from the class of 2013 attempted the National EMT Certification cognitive examination and 33% (n = 19,899) were unsuccessful the first attempt. The proportion of males and females who were unsuccessful did not differ (males: 34%, n = 12,642; females: 33%, n = 6,147, p = 0.05). More than one-third of unsuccessful candidates received the maximum number of questions (56%, n = 7,128) while 40% (n = 7,985) received the minimum number of questions. Of those unsuccessful on the first attempt, 66% (n = 11,311) attempted a second examination. More maximum length testers attempted a second examination compared to minimum length testers (72%, n = 5,159 vs. 48%, n < 0.001). Conclusions: Two-thirds of first-time candidates unsuccessful on the National EMT Certification cognitive examination attempted a second examination. A greater proportion of those close to the passing standard (maximum length testers) retested. Future work is needed to bet-
provider (APP) and a firefighter/paramedic with the mission of treating and releasing patients, providing linkage to further care. This is a description of the first 19 months of service. Methods: This was a retrospective review of LAFD electronic health records from January 2016 to August 2017 in the Los Angeles area. The APRU was active 4 days a week for approximately 82 weeks. Enrolled patients were either low-acuity 9-1-1 callers, identified through monitoring 9-1-1 radio traffic or housed (i.e., non-homeless) 9-1-1 frequent users identified from prior LAFD health records. Summary descriptive statistics were collected. Results: The APRU was linked to 1,079 incidents over approximately 328 days of service (mean 3.3 incidents/day). Of these incidents, there were 127 cancellations, 88 found no patient, 13 refused care, and another 12 were ineligible for APRU care. The remaining 839 were treated (77.8%). Of those treated, 379 (45.2%) were treated and transferred to another transporting unit, 360 (42.8%) were treated and released on scene, and 100 (11.9%) were treated and transported. Of the 100 transported by the APRU, 56 were transported to a hospital with 55 transported directly to mental health clinics and 3 to a sobering center. Of the 360 treated and released on scene, the APRU spent an average of 23 minutes on scene (minimum 1 minute, maximum 1 hour 15 minutes, median 20 minutes).

Conclusions: The LAFD APRU has shown promise in decreasing costly EMS transports and providing medical care where leverage of the diagnostics skills of the APP patients can be treated and released on scene or medical cleared for alternate destinations. Further research is needed to study this novel type of EMS care.

73. Predictive Value of Each Component Field triage guidelines on Hospital Outcome in EMS-Treated TBI

Sola Kim, Sang Do Shin, Kyoung Jun Song, Young Sun Ro, Jeong Ho Park, Seoul National University Hospital CATEGORY OF SUBMISSION: Student, Resident, Fellow

Background: Unbiased estimates for field triage guideline performance are important in optimizing emergency systems and improving outcomes among seriously injured patients. The accuracy of each triage component has not been evaluated in traumatic brain injury (TBI) patients, nor has the performance in triage success. The accuracy of each triage component has not been evaluated in traumatic brain injury (TBI) patients.

Methods: This was a cross-sectional observational study using a nationwide, prospective registry of severe trauma patients treated by emergency medical services (EMS) providers in 10 provinces in Korea. The study population was adult TBI patients between January 2013 and December 2014. The main exposure was each component of field triage guidelines set by the American College of Surgeons Committee on Trauma and Centers for Disease Control and Prevention as determined by EMS provider. The primary outcome was hospital mortality and secondary outcome was disability at discharge. Disability is defined as new or worsening deficit on the Modified Early Outcome Scale (mEOS) including death than pre-event GOS. Sensitivity, specificity and area under the curve (AUC) were calculated. Results: Total 5,133 patients met inclusion criteria. Of these, 2,153 (41.9%) met 51.4% of patients had disability. The sensitivity and specificity for mortality of the physiologic, anatomic and mechanical criteria were 91.4% and 47.3%, 20.0% and 93.15%, 57.8% and 89.3%, respectively. Among each component of criteria, altered mentality showed highest sensitivity and specificity for mortality, which was 89.2% (95% CI 87.4 to 91.0) and 0.669 (95%CI 0.687 to 0.711). Amputation and chest wall instability in anatomic criteria showed highest specificity for mortality (99.6%, 96.3%, and 99.9%). Altered mentality showed highest sensitivity and AUC for disability, which was 75.9% (95% CI 71.4% to 77.8%) and 0.671 (95% CI 0.658 to 0.684), respectively. Conclusions: The physiologic criteria of field triage guidelines showed high sensitivity for mortality. Anatomic and mechanical criteria showed low sensitivity and high specificity. The trend was similar for disability. Altered mentality of physiologic criteria showed highest sensitivity and AUC among each component of field triage scheme.

74. Effect of Chest Compression Parameter Variation on Waveform Characteristics of the Ventricular Fibrillation Electrocardiogram

David Salcido, Matthew Sundermann, Allisson Koller, Rana Sufin, John Kucewicz, Pierre Mourad, Graham Nichol, James Menegazzi, Adeyinka Adedipe, Department of Emergency Medicine, University of Pittsburgh. School of Medicine CATEGORY OF SUBMISSION: CARDIAC

Background: The ventricular fibrillation (VF) electrocardiogram (ECG) waveform is known to deteriorate over time if untreated, recover with chest compressions, or fibrillation succed. VF ECG measures could inform CPR quality feedback algorithms based on patient physiologic response. Objectives: Investigate the effects of chest compression rate, depth and duty cycle (DC) on VF ECG waveform characteristics in a swine cardiac arrest model.

Methods: Twelve mixed-breed domestic swine were used (2 × 6 groups). The swine were anesthetized (fentanyl and paralysed) (vecuronium), followed by endotracheal intubation and mechanical ventilation. Animals were instrumented with a battery of physiological sensors, including multi-lead ECG (BioAmp, ADInstruments, Inc), recorded continuously with a high-fidelity data acquisition unit (Pow-erLab, ADInstruments). 80 Hz, Ventricular fibrillation was induced with a 3-second 100 mA transhoracic shock. After 7 minutes, animals were randomized to receive continuous CPR with a custom robotic device using 1 of 6 pre-programmed, 2-phase CPR schemes that varied 1 parameter in 5 × 1-minute intervals per phase while holding the other 2 parameters fixed. Frequency (F), amplitude (A), and slope-based (MS) quantitative ECG characteristics of artifact-filtered ECG were calculated from 3-second segments at the end of each 1-minute interval, and compared between rate, depth and DC schemes, as well as experimental phases. Correlations between CPR parameter settings and ECG characteristics were calculated. Results: Compression rate showed a low-to-moderate correlation (0.454) with change in MS in Phase I, however neither DC nor depth showed a correlation with either A or MS. In GPOVA models, MS differed between CPR groups at the end of Phase I (p = 0.046) but not AMSA, suggesting limited response of quantitative ECG measures after extended time intervals. Conclusions: In phase early CPR rate appeared to be related to quantitative characteristics of the VF ECG.

75. Variation in the Characteristics of Patients with Acute Stroke Arriving by EMS Versus Those Arriving by Private Vehicle

Robert O’Connor, Karen Braden, Joseph Carrera, Nicole Chiota-McCollum, Elizabeth Hunt, George Lindbeck, Karen Johnson, University of Virginia School of Medicine CATEGORY OF SUBMISSION: MEDICAL

Background: We conducted this study to identify differences between patients arriving by EMS versus those arriving by private vehicle with acute ischemic and hemorrhagic stroke. Determination of these differences may allow for refinement of public education on the timely treatment of acute stroke.

Methods: This study was conducted at an academic medical center that is an accredited comprehensive stroke center. Consecutive patients with acute stroke were enrolled between January 2015 and May 2017, and were categorized by mode of arrival (EMS vs. private vehicle).

Results: A total of 795 patients were enrolled with 716 (77%) arriving by EMS and 219 (23%) arriving by private vehi-

Conclusions: EMS Versus Those Arriving by Private Vehicle. A total of 795 patients were enrolled with 716 (77%) arriving by EMS and 219 (23%) arriving by private vehi-

of acute stroke were enrolled between January 2015 and May 2017, and were categorized by mode of arrival (EMS vs. private vehicle).

Conclusions: Stroke patients arriving by EMS have significantly higher NIHSS, ICH score, and Hunt & Hess score and significantly shorter time than "last known well" than those arriving by car. Because a significant proportion of ischemic stroke patients arrive by car, public education efforts should focus on identification of stroke patients with longer symptom duration and those with lower NIHSS.

76. Carotid Blood Flow Is Dependent on Rate and Duty Cycle During CPR Cardiac


Background: We have previously presented data that blood flow generated by piston-type mechanical chest compressions (CC) is sensitive to changes in the inter-compression pause time, which changes both chest compression rate and duty cycle. We sought to clarify the dependence of CC generated blood flow on changes in CC rate and duty cycle during CPR. We hypothesized that the observed dependence of CC generated blood flow on changes in inter-compression pause time is due to the change in CC duty cycle.

Methods: CPR was performed on five domestic swine (∼30 kg) using standard physiologic monitoring. Blood flow was measured by Doppler in the right common carotid artery. Ventricular fibrillation (VF) was electrically induced. CC were delivered at a rate of 125 or 50 compressions per minute (cpm) with a duty cycle of 45% or 25% fixed. We varied the CC depth of 2” for a total of 6 minutes after 2 minutes of "break-in" CPR (increased depth from 1 inch to 2 inches). CC rate or duty cycle were
Results changed every 1.5 minutes.

Out-of-Hospital Cardiac Arrest

78. Effect of Early Detection by Dispatcher on Survival Outcomes after Prehospital Cardiac Arrest

Seo Young Ko, Sang Do Shin, Kyoung Jun Song, Ki Jeong Hong, Young Sun Ro, So Yeon Kong, Taekyung Kim, Kyeong Seon Kang, Sae Hyun Kang, In Young Lim, Seong Hwa Kim, Kang In Park, San Sun Park, Jung Soo Kyung, Ki Jeong Hong, Young Sun Ro, So Yeon Kong, Tae Yong Hong, Wonpyong Kim, Kyung Min Oh, Byeong Hoon Hwang, Sung Gyu Lee, Woonghyun Kim, Young Soo Kim, Gi Young Kim, Dong Seon Jeong, Jun Young Kim, Ki Jeong Hong, Young Sun Ro, So Yeon Kong, Tae Yong Hong, Wonpyong Kim, Kyung Min Oh, Byeong Hoon Hwang, Sung Gyu Lee, Woonghyun Kim, Young Soo Kim, Gi Young Kim, Dong Seon Jeong, Jun Young Kim, Ki Jeong Hong, Young Sun Ro, So Yeon Kong, Tae Yong Hong, Wonpyong Kim, Kyung Min Oh, Byeong Hoon Hwang, Sung Gyu Lee, Woonghyun Kim, Young Soo Kim, Gi Young Kim, Dong Seon Jeong, Jun Young Kim

Background: Dispatcher-assisted cardiopulmonary resuscitation (DA-CPR) is an important intervention to improve outcomes of out-of-hospital cardiac arrest. We studied the association between the time to detect cardiac arrest by dispatcher and outcomes in out-of-hospital cardiac arrest (OHCA).

Methods: We conducted a cross-sectional study. All adult OHCA of presumed cardiac etiology and bystander witnessed between 2013 and 2015 were analyzed. The main exposure of interest was time from EMS contact to detection of cardiac arrest by dispatcher. Patients with unknown time to detection by dispatcher or extremely longer detection time (>20 minutes), and unknown outcomes were excluded. Time to detection of cardiac arrest by dispatcher was classified into the early (0–90 seconds), middle (91–180 seconds), and late (181–1,200 seconds) groups. The primary outcome was survival to discharge and secondary outcome was good neurological recovery. Multivariable logistic regression analysis was performed, adjusting for dispatcher, environmental, and dispatcher factors. Results: Of 83,083 OHCA, 6,539 (7.9%) patients were instructed DA-CPR between 2013 and 2015. A total of 6,383 (7.7%) patients, excluding cases who did not receive bystander CPR, the rates of DA-CPR performed were 28.7%, 43.0%, and 28.3% in early, middle, and late detection groups, respectively. Overall, survival to discharge occurred in 635 (9.9%) OHCA and good neurological outcome was observed in 441 (6.9%) patients. After adjusting for potential confounders, however, time to recognize cardiac arrest was associated with decreased odds of survival to discharge for both middle (AOR 0.74, 95% CI 0.59–0.91) and late groups (AOR 0.75, 95% CI 0.59–0.94) compared with early group. There was no significant association between recognition time and good neurological outcome (Middle vs Early AOR 0.81 (0.63–1.04), Late vs Early AOR 0.95; p = 0.60–0.35), Late vs Middle AOR 0.95; CI 0.98 (0.76–1.26). Metropolis status was significant effect modifier, especially for the regional areas, compared to the urban group, AORs (95% CI) for survival to discharge were 0.65 (0.49–0.85) in the middle group, 0.68 (0.51–0.90) in the late group. Further, there was no significant association between recognition time and survival to discharge (Middle vs Early AOR 0.95; CI 0.91(0.64–1.30), Late vs Early AOR(95%CI) 0.89 (0.60–1.26)).

Conclusions: The shorter duration from the EMS call to recognition of cardiac arrest by dispatcher was associated with favorable outcomes after OHCA.

79. Impact of Real Time Chest Compression Feedback Increases with Application of the 2015 Guidelines

Ali Shams, Chris Kanaan, Rebeca Grysziewicz, Chris Kazmierczak, Laura Steuber, Robert Swor, Beaumont Health Category of Submission: Student, Resident, Fellow

Background: A body of knowledge has evolved that has demonstrated improved survival and functional outcome following the use of timely mechanical endovascular therapy. To decrease time to care, EMS policy makers have begun to develop methods to identify and triage EMS LVO stroke patients to comprehensive stroke centers (CSC). Our objective was to assess whether time to definitive care for LVO stroke patients is decreased in patients who present directly to a CSC compared to patients who are transferred from a primary stroke center.

Methods: We performed a cohort study of patients admitted to a single suburban CSC (July 2015–December 2016) with a diagnosis of LVO stroke. Patients presented directly to the CSC, or were transferred by air or ground from a primary stroke center. Time intervals from arrival at either facility to interventional skin puncture (access) and repertusion at the CSC were recorded. Transfer distance was calculated using Google Maps. Because we were interested in patients presenting within a regional EMS system, we included patients transferred within a 15-mile radius. Non parametric statistics were used for comparison of medians and range was used.

We had a total of 62 cases admitted to our CSC, with 34 transported within 15 miles. Of these, 10 patients were direct transports (15 via EMS and 10 via private air ambulance). The remaining 22 were transferred from 7 hospitals. As expected, transferred patients had shorter times from CSC arrival to access and repertusion [median, 30.5 seconds vs. 60.1 seconds (p < 0.01)].
improvement. These data provide base-line of aspirin and 12 lead ECG use. On the trauma chest pain. Of these, 199, 123 or 37.4% received both aspirin and a 12 lead ECG, the proportion of patients with acute decompen-sated heart failure has been shown to provide meaningful clinical benefit. There has not yet been a way to provide benchmarks on these measures based on large national datasets. We aim to describe national performance on these measures. Methods: Using a 6 1/2-year convenience sample of records from 9-4-1 consenting EMS agencies using ESO Solutions electronic health record (EHR), we calculated compliance with the following performance measures: the average time from dispatch to first defibrillation in shockable rhythms, the proportion of these provided within 5 minutes, the proportion of patients over 30 or an SpO2 < 90 who received both NTG and NIPPV. For times, we provide the average, median and interquartile rank. For proportions, we also calculate confidence interval. Results: Of 11,144 cardiac arrests with an initial shockable rhythm, 1,630 or 14.6% (14.0–15.3%) were defibril-lated within 5 minutes. The average time to first defibrillation was 2.19 minutes, IQR 1.96–3.12 min. There were 533,127 patients over 35 with nondiabetic chest pain. Of these, 199,123 or 37.4% (37.2–37.5%) received both aspirin and a 12 lead ECG. Among 2,612 patients with AF and 2,100 or 80.4% (78.9–81.9%) of these received (37.2–37.5%) received both aspirin and a 12 lead ECG, and the proportion of patients with acute decompen-sated heart failure (ADHF) as defined by SSB > 200 and either a RR > 30 or an SpO2 < 90 who received both NTG and NIPPV. For times, we provide the average, median and interquartile rank. For proportions, we also calculate confidence interval. Results: Of 11,144 cardiac arrests with an initial shockable rhythm, 1,630 or 14.6% (14.0–15.3%) were defibril-lated within 5 minutes. The average time to first defibrillation was 2.19 minutes, IQR 1.96–3.12 min. There were 533,127 patients over 35 with nondiabetic chest pain. Of these, 199,123 or 37.4% (37.2–37.5%) received both aspirin and a 12 lead ECG. Among 2,612 patients with AF and 2,100 or 80.4% (78.9–81.9%) of these received both NTG and NIPPV. Conclusions: There was a low rate of rapid defibrillation pointing out the difficulties with achievement of this metric without non-EMS (public) support. There was also poor compliance with a chest pain bundle of aspirin and 12 lead ECG use. On the other hand, there was much better use of NTG and NIPPV in ADHF. These data provide baseline performance benchmarks for use in system improvement.

82. Characteristics Associated with Success on the National AEMT Certification Examination

Madison Rivard, Rebecca Cottle, Remi Crowe, Jennifer Marmur, Anil Mitchel, Anshul Panchal, The National Registry of Emergency Medical Technicians Category of Submission: Operations, Quality, Safety Systems, Disaster, Disaster

Background: Advanced emergency medical technician (AEMT) certification, the provider level between emergency medical technician (EMT) and paramedic, was first issued on a national level in 2011. While characteristics of examination success at other provider levels have been described, little is known regarding the AEMT level. Our objective was to examine the association between AEMT graduate characteristics and success on the National AEMT Certification Examination. Hypothesis: We hypothesized that prior EMT experience, program entrance exams, course-ending final exams, and exam fee payor would be associated with success. Methods: We performed a cross-sectional evaluation of all first-attempt National AEMT Certification cognitive examination results from October 2016 to April 2017. Upon completion of cognitive examination, a brief, voluntary questionnaire was administered assessing graduates’ characteristics and experiences. Descriptive statistics were calculated, and the association between characteristics reported by graduates and success on the exam was assessed using univariable logistic regression models (OR, 95%-CI). Results: In the study period, 3,835 AEMT graduates attempted the cognitive examination and 2,372 completed the post-test questionnaire (response rate = 62%). Among those who completed the questionnaire, 67.9% were successful on the first attempt. Compared to those with no EMT experience prior to enrollment in an AEMT program, those with one to five years of experience had greater odds of passing (1.36, 1.10–1.71), while more than five years of EMT experience was not significantly associated with examination success (1.09, 0.84–1.42). Attendees who were required an entrance exam was not associated with odds of success (0.85, 0.69–1.05). However, respondents who were required by their program to complete a final course-ending cognitive examination exhibited higher odds of success compared to those who did not (2.15, 1.78–2.65). Compared to those who paid for their own exam, there was no difference in odds of passing for those whose employers (1.21, 0.99–1.49) or programs (1.16, 0.85–1.58) paid some/all of the exam fees. Conclusions: Prior EMT experience and program course-ending cognitive examinations were significantly associated with increased odds of success on the National AEMT Certification Examination. Future work should examine the impact of program entry requirements and program curriculum composition on graduate performance.

83. Change in Quantitative Ventricular Fibrillation Over Bouts of Chest Compressions in CPR

Matthew Sundermann Sundermann, David Salcido, James Menegazzi, Department of Emergency Medicine, Washington University School of Medicine Category of Submission: Student, Resident, Fellow

Background: Chest compressions (CC) given during cardiac arrest generate blood flow to the brain and other vital organs, but the effect of CC is dependent on the quality of CC characteristics. Quantitative ECG (QECG) features of the ventricular fibrillation (VF) waveform correlate with myocardial perfusion levels during cardiac arrest and provide a good quality metric. We hypothesized that there would be an association between change in QECG measures and CC characteristics. Methods: CC process and association with hospital ECG data were retrospectively extracted from defibrillator downloads obtained from the continuous chest compression (C3C) project of the Resuscitation Outcomes Consortium (ROC). Cases were included if they had at least one defibrillator file with a bout of CC bounded by anal- yzable ECG signal segments, and amounted to 25,210 bout-gap intervals spanning 1,099 unique cases. For each bout, the QECG mea- sures of AMSA, MS, LAC, and DFA were calculated for the starting and ending ECG segments around the bout. Metrics were calculated for the intervening bout of CC. CC process metrics included rate, depth, duty cycle, fraction, bout duration, dose rate, dose depth, and duration. We analyzed the relationship between CC metrics and QECG by regressing the change in QECG measures from the start each bout to the end of that bout against the CC process parameters for that bout in multivariable models including bout duration and patient characteristics. Results: CC rate was associated with change in QECG value and wave shape in MS (t = 2.13, coefficient 8.92, p = .0330). Other associations between chest compression parameters and dQECG were not significant. Conclusions: These results suggest a limited relationship between CC process metrics and QECG measures during resuscitation of out-of-hospital cardiac arrest.

84. The Utilization of a Province Wide EMS System by Children and Youth with Mental Health Complaints

Aaron DeRosa, Michael Zhang, Judah Goldstein, Carl Jarvis, Department of Emergency Medicine, University of Prince Edward Island, Atlantic Regional Training Centre Category of Submission: Student, Resident, Fellow

Background: Children and youth Emergency Department (ED) and hospital based mental health(MH) service use is increasing in Canada and the United States. This may extend to the EMS setting. Our objective was to describe trends and characteristics of EMS utilization by children and youth with MH complaints. Methods: We conducted a retrospective popula-tion based quantitative descriptive study, using secondary data from the provincial EMS database. Patients 5 to 18 who utilized EMS for MH related complaints between 2010 and 2015, inclusive, were used in the analysis. We described prevalence, demographics, and operational characteristics. MH calls were based on chief complaint or clinical impression relating to MH and resemble the Canadian ED short list of Diagnosis under Mental and Behavioural Disorders. Results: There were 342,062 MH related calls over the study period compared to a 9% increase in all EMS calls in the same age group. Females had the largest increase (47%) in MH related complaints over the study period. The majority of patients were single users (n = 1436, 68%), whereas, 180 repeat users accounted for 50(24%) responses, ranging from 2-13 inci-dents over the study period. Most patients were transported (n = 1920, 91%). The two most common conditions addressed by paramedics were overdose/poisoning (n = 1747, 83%), and depression/suicide attempt (n = 1257, 35%) was the most prevalent charted co-morbidity, followed by Attention-Deficit Disorder/ Hyperactivity Disorder (n = 207,28%). When categorizing patients over a calendar year, 2035 patients were transported (n = 1011, 63 calls per year), 108 patients were medium users (2-4 calls per year), 8 patients were high users (5-14 calls per year). We observed an increasing trend in MH related EMS ser-vice use by children and youth. The majority of patients are transported by paramedics to the ED. This trend should be considered when developing EMS policies, programs, and training for paramedics.
Background: To evaluate adherence to American Heart Association (AHA) recommendations for optimal care for out-of-hospital cardiac arrest (OHCA) across the spectrum of prehospital care by analyzing care rendered by bystanders, dispatchers, first responders (FR), and emergency medical services (EMS) providers in a metropolitan area. Methods: A total of 294 OHCA events treated by a single ambulance service in Minnesota in 2014–2015 occurred before ambulance arrival in adult patients with witnessed out-of-hospital cardiac arrest and had complete data available for bystander, dispatcher, first responder, and EMS care elements. An adherence index (AI, range = 0 to 6) was calculated based on successful delivery of six care elements aligned with AHA recommendations: dispatcher provided instructions for CPR when indicated, FR initiated chest compressions (pre-ambulance CPR), bystander or FR placed an AED (pre-ambulance AED), compression fraction during EMS CPR > 0.8, compression rate during EMS CPR of 100–120/min, and number of pauses > 10 sec in duration during EMS CPR was < 3. Only the first 10 minutes of compressions were considered for EMS CPR criteria. Data sourced included audio recordings of dispatch calls, the Cardiac Arrest Registry to Enhance Survival (CARES) registry data, and transthoracic impedance data tracings. Results: The first 10 minutes of compressions were considered for EMS CPR criteria. Data sourced included audio recordings of dispatch calls, the Cardiac Arrest Registry to Enhance Survival (CARES) registry data, and transthoracic impedance data tracings. Results: Adherence to individual guidelines was generally high: dispatcher instructions for CPR = 100%, pre-ambulance CPR = 93%, pre-ambulance AED = 72%, compression fraction = 84%, compression rate = 91%, and number of pauses > 10 sec = 3. 81% Care was delivered in accordance with all six criteria (AI = 6) in 52% of events (n = 153) and the AI was ≥ 5 in 78% of events (n = 226). The number of events with AI ≥ 5 increased from 70% among 2014 cases to 83% among 2015 cases (p = 0.009). Conclusions: Adherence to the guidelines for Ohio Health Care management that was studied is very high in this system of care and appears to be increasing. Identified opportunities for improvement include increasing pre-ambulance AED use and reducing pauses during EMS CPR.

87. RECOGNITION OF OUT-OF-HOSPITAL CARDIAC ARREST BY CALLS TO 911: A Multi-Level Analysis

Sun Young Lee, Sang Do Shin, Kyung Jun Song, Ki Jeong Hong, Soyeon Kong, Tae Hae Kim, Seoul National University Hospital Category of Submission: Cardiac

Background: In dispatcher-assisted cardiopulmonary resuscitation (CPR) program, dispatchers’ recognition of out-of-hospital cardiac arrest (OHCA) is the first step to initiate bystander CPR. This study aimed to investigate whether the community CPR awareness is associated with recognition of arrest, provision of CPR instruction, and bystander CPR.

Methods: A total of 18,198 OHCA cases in the intervention group and 564 OHCA cases in the historical control group. Bystander CPR was performed in 141 patients (25.1%) in 2014 and 119 patients (23.6%) in 2015. Survival to discharge was observed in 31 patients (5.5%) in 2014 and 56 patients (10.0%) in 2015 (p-value = 0.57). The adjusted odds ratios (95% CI) of recognizing arrest and survival to discharge for intervention group compared to control group were 0.80 (0.60 to 1.06) and 0.94 (0.57 to 1.54), respectively.

Conclusions: The text message alert system for CPR trained citizens was not associated with a significant increase in bystander CPR and survival to discharge rates.
were identified. Two CPR quality metrics, chest compression fraction (CCF) and CC rate (CCra), were used to monitor CPR using an accelerometer-based technology (E & X-Series), and compared between 3 groups: packaging (terminal 5 minutes on scene), loading (terminal 3 minutes until transport). Mechanical CPR was performed using AutoPulse® (ZOLL Medical), while most cases of manual CPR were performed with real-time audiovisual feedback (Real CPR Help®). Manual CPR (metronome rate of 100 beats per minute [bpm]) and mechanical CPR (set CCra of 80 bpm) were compared by the median proportion of time in which the CCra was ±5 bpm of the target range (pCCra) and the mean CCra is reported using the Wilcoxon rank-sum test. Results: 357 cases were reviewed and 239 excluded: no age or age ≤18 years (6), medical or unknown location (31), non-cardiac etiology (67), data unavailable (115), leaving 118 included. No significant difference in CCra was noted between the two groups during transport (p = 0.47). In cases with mechanical CPR, CCra was higher during packaging 85.0 vs. 74.5 (p = 0.0043) and loading 86.0 vs. 72.2 (p = 0.001) than in cases with manual CPR. For the mechanical CPR, CCra was more frequently within the target range during all study periods 0.4 versus 0.8 (p = 0.001), 0.3 vs. 1 (p = 0.0021), and 0.5 vs. 0.8 (p = 0.002). For the manual CPR, use of a mechanical CPR device was associated with higher CCra during patient packaging and loading and a higher proportion of time within the target range during all time periods. Use of mechanical CPR may improve CPR quality without exposing providers to the risks of performing manual CPR during the packaging, loading, and transport of OHCA patients.

90. Is Prehospital Epinephrine Used Appropriately in Pediatric Anaphylaxis? Joslyn Joseph, Brian Walsh, David Feldman, Morristown Medical Center CATEGORY OF SUBMISSION: PEDIATRIC

Background: Anaphylaxis is an acute, life-threatening condition that requires immediate recognition and treatment. The goal of therapy should be early recognition and treatment with epinephrine to prevent progression to respiratory compromise or cardiovascular collapse. More prehospital providers, parents, and school nurses, are being instructed in using epinephrine. We sought to determine when epinephrine is used in children and, more importantly, how often it is administered correctly for anaphylaxis.

Methods: Setting: A suburban two-tiered EMS system and all units evaluate approximately 600 patients under age 13 per year. Patients: Children less than 13 years old over a 5-year period for whom ALS was dispatched for “Anaphylaxis/Anaphylaxis”. Protocol: Demographics, history of present illness, vital signs, and interventions performed prior to EMS arrival and by EMS personnel were extracted using the institution’s electronic medical records. The percentage of patients with 95% confidence intervals (“CI”) who were given epinephrine prior to EMS arrival, by EMS, and overall were calculated. Anaphylaxis was defined as acute cutaneous and/or mucosal involvement after antigen exposure plus one of the following: respiratory compromise, cardiovascular compromise, or persistent GI symptoms. Appropriate treatment was defined as epinephrine being administered when the patient’s clinical syndrome met the definition of anaphylaxis, or being withheld when the clinical syndrome did not meet the definition. The percentage of patients who were treated appropriately was then calculated with CI. Results: Out of 2,750 ALS calls for patients under 13 years old, 287 (10.4%) were for “Allergy/Anaphylaxis.” The average age of patients was 6.5 years and 63% were male. 92% of the time there was a difference in overall treatment of epinephrine - 49% (CI: 44–55) prior to EMS arrival, and 10% (CI: 6–13) by ALS personnel. The percent of patients who received appropriate treatment was 62% (CI: 56–68%). Of the patients in inappropriate treatments, epinephrine was given inappropriately 30% (CI: 24–35%) of the time, and was withheld inappropriately 9% (CI: 5–15%) of the time. These differences may reflect increasing incidence and public awareness of life-threatening allergic reactions, both laypeople and prehospital providers struggle to diagnose anaphylaxis in pediatric patients. More education is needed to recognize this disease process and treat it appropriately.

91. Pediatric Out-of-Hospital Cardiac Arrest (POHCA) Occurs Infrequently, Yet Requires the Same Urgency as for Adults. Therefore, Inappropriate Treatments, Epinephrine is Administered Prior to EMS Arrival and After Implementation of a Standardized Resuscitation Tool

Scott Alter, Lisa Clayton, Richard Paley, Richard Shih, Florida Atlantic University CATEGORY OF SUBMISSION: PEDIATRIC

Background: Pediatric out-of-hospital cardiac arrest (POHCA) occurs infrequently, yet requires the same urgency as for adults. Therefore, inappropriate treatments, epinephrine is administered prior to EMS arrival and after implementation of a standardized resuscitation tool.

Methods: Design: retrospective chart review. Setting: county-based ALS service with 87,000 calls per year, covering a population of 635,000 over 2,000 square miles. Subjects: patients under 13 years old, 287 (10.4%) were treated appropriately was then calculated with CI.

Results: 23

92. Comparison of Commercial Tourniquets in a Pediatric Trauma Patient Model

James Vretis, Center for Tactical Medicine CATEGORY OF SUBMISSION: PEDIATRIC

Background: Young children and adolescents are frequently injured in peacetime and wartime. Reviews of trauma registries at U.S. military medical facilities during the Iraq and Afghanistan conflicts show that as the age of a child increases, the injury severity and mortality increases. Tourniquet use for control of extremity hemorrhage in adult trauma patients is associated with increased survival with only minimal tourniquet associated morbidity. Use of commercial tourniquets designed for adults when applied to pediatric patients of different ages. Methods: The institutional Ethics Review Board approved the study. The study was a prospective and non-blinded test of nine commercial tourniquets on a pediatric arm hemorrhage test model using six sized tourniquets to simulate injuries on the 7.62 and smaller diameter mannequin. Results: Of these, two had ROSC after EMS arrival and survival to hospital discharge also occurred (0% vs. 4%; 95% CI: 0.06–0.12). Conclusions: We have shown that many commercially available tourniquets do not stop fluid flow in our pediatric arm hemorrhage test model.

93. Prehospital Blood Pressure Measurement in Major Traumatic Brain Injury: Concordance Between EMS Provider Documentation and Non-invasive Monitor Data Tracking

Octavio Perez, Octavio Perez, Eric Helfenbein, Bruce Barnhart, Saeed Babaeizadeh, Dawn Jorgensen, Chengcheng Hu, Valsal Chikani, Joshua Gathe, Samnith Grill, Daniel Spalte, University of Arizona CATEGORY OF SUBMISSION: OPERATIONS, QUALITY, SAFETY SYSTEMS, DISASTER, DISASTER

Background: Recent studies have shown that the lowest prehospital systolic blood pressure (SBP) is strongly associated with mortality across a remarkably wide range (far above 90 mmHg) in traumatic brain injury (TBI). Furthermore, in TBI research, case ascertainment and risk-assessment is highly dependent upon documentation of prehospital BP. Objective: To identify the concordance between the lowest SBP documented by EMS personnel in patient care records (PCR) and the recorded non-invasive monitor data in TBI. Methods: A subset of major TBI cases (moderate/severe; CDC Barell Matrix 1) in the EPIC...
EMS TBI Study (NIH R01NS071049) were evaluated (3/13–3/17). Cases from 6 EMS agencies that did not complete the monitoring data capture (MRSTM) as part of EPIC were included. All monitor data available for this post-hoc review were displayed and accessible to the providers during EMS care. We compared the lowest PCR-documented SBP to the monitor-registered value in each patient. Results: 132 cases were included (median age: 52, 65% male). In 96 cases (72.7%), the lowest PCR-documented SBP was exactly concordant with the lowest monitor value. When concordance was defined by the difference being ≤5 mmHg, 113 (85.6%) were concordant. Among the 16 patients with guideline-resistant identified by the monitor (<90 mmHg), only 11 (68.8%) were documented in the PCR. Conclusions: Significantly more were concordant than simply not being documented. Furthermore, case ascertainment, confounding, and risk factors for hypotension may be substantially impacted. Whenever possible, quality improvement and research projects should utilize monitor data to identify and evaluate hypotension. Development of monitor-based real-time audiovisual feedback technology might improve provider identification of hypotension.

94. Evaluating the Gender Gap in EMTS and Paramedics Obtaining National EMS Certification from 2007 to 2016

William Krebs, Remle Crowe, Rebecca Cash, Madison Rivard, Ashley Larimore, Christine Hamilton, Ashchan Panchal, Department of EM, The Ohio State University Wexner Medical Center Category of Submission: Operations, Quality, Safety Systems, Disaster, Disaster

Background: With roots in battlefield medicine and the fire service, the EMS workforce has traditionally been comprised of mostly male providers. As the EMS profession has evolved in both prominence and function, it is unknown how the gender composition of the workforce has changed over time. The purpose of our study was to describe the proportion of females who earned National EMS Certification at the EMT and paramedic levels over a 10-year period (2007–2016). We hypothesized that the proportion of female EMTs and paramedics earning certification increased during this time. Methods: This was a longitudinal assessment of all EMTS and paramedics earning initial National EMS Certification from 2007 through 2016. There is no national database of all licensed EMS professionals, however National Certification is required to earn initial licensure at one or more provider levels in the majority of states. We assessed all EMS professionals who earned initial EMT or paramedic certification between January 1, 2007 and December 31, 2016. Descriptive statistics were calculated. A non-parametric test of trend was used to assess for increasing or decreasing proportions of females earning certification during the study period. Results: In 2007, a total of 28.7% of EMTs earning initial certification were female compared to 34.8% in 2016 (p = 0.022). The mean age of females at the time of their certification was lowest in the patient compartment during the study period. While statistically significant (p-trend = 0.03), the overall increase was less than one percentage point per year (21.4% in 2007 to 22.1% in 2016). A change of less than 2% was noted in 8 of 9 year-to-year comparisons. Conclusions: While the proportions of females earning initial National EMS Certification increased for EMTs, the population earning paramedic certification remained relatively stable over the ten-year period. Despite other health care fields closing the gender gap, paramedic certification has not followed this trend. Further research is needed to identify the underlying reasons and barriers for the lack of change in the paramedic gender composition of those earning National EMS Certification.

95. Impact of Community Paramedic Home Visits on CHF Patients: A Pre-Post Assessment of Heart Failure on Quality of Life

Sandi Wewerka, Joseph Pasquarella, Ann Majerus, Aaron Burnett, Matthew Simpson, Paula Miller, Regions Hospital Category of Submission: Operations, Quality, Safety Systems, Disaster, Disaster

Background: Effective management of congestive heart failure (CHF) often requires patients to make significant lifestyle changes, which may be better achieved by care providers in the patient’s home. The objective of this study was to evaluate the effectiveness of a fire-based community paramedic (PCP) program on CHF management. Methods: A total of 25 patients were discharged from the hospital using the Minnesota Living with Heart Failure® Questionnaire (MLHF). We hypothesize that PCP visits will contribute to improvement in the patient’s quality of life as assessed by the MLHF. Methods: Patients with a CHF-related hospitalization who provided consent to participate in the CP program completed the pre- and post-vision. The CP program entailed weekly home visits from a CP. The MLHF is a validated questionnaire that uses a Likert scale to measure the effects of CHF symptoms, functional limitations and psychological distress. Each symptom is rated on a 0–5 scale, with a score of 5 corresponding to the greatest detriment to quality of life. The MLHF scores range from 0–105. Results: Twenty-three patients completed the pre- and post-vision. The pre-vision values on the MLHF resulted in a mean score of 50% of patients declaring their highest symptom of CHF as hypotension. At the end of the study period, the post-vision values resulted in a mean score of 42.7%. The pre-vision values were significantly higher than the post-vision values (p = 0.0216). The post-vision values were significantly lower than the pre-vision values (p = 0.022). The mean pre-vision score for physical symptoms was 25.78 (SD = 12.06) while on the post-vision it was 21.22 (SD = 11.66). The mean of the emotional score on the pre-vision was 12.47 (SD = 8.55) while on the post-vision it was 9.96 (SD = 8.48). Total scores were significantly different between the pre and post visions (p = 0.0216). The pre-post difference in emotional score was not different (p = 0.21). Conclusions: Using the MLHF, we found significant improvement in QOL of CHF patients who completed the CP program compared to that observed by the small sample size but demonstrates encouraging improvements to this patient population.

96. Seatbelt Use by Ambulance Personnel in the Patient Compartment Is Low Regardless of Patient Presence, Seating Position, or Patient Acuity

Rebecca Cash, Evan Crowe, Remle Crowe, Madison Rivard, Anne Knorr, Ashish Pan- cha, Brian Hughes, Regions Hospital Category of Submission: Operations, Quality, Safety Systems, Disaster, Disaster

Background: With roots in battlefield medicine and the fire service, the EMS workforce has traditionally been comprised of mostly male providers. As the EMS profession has evolved in both prominence and function, it is unknown how the gender composition of those earning National EMS Certification has not followed this trend. Future research is needed to identify the underlying reasons and barriers for the lack of change in the paramedic gender composition of those earning National EMS Certification.

97. Feasibility of Manual Active Compression Decompression CPR in a Thirty-Degree Head Up Position

Heather Ellis, David Chase, Ventura City Fire Department Category of Submission: Cardiac

Background: Manual active compression decompression CPR (ACD CPR) with ITD (impedance threshold device) in supine position has shown improved outcome in out-of-hospital cardiac arrest. Automated ACD CPR with ITD in a thirty-degree head up position (HUP) has shown improved cerebral perfusion in porcine and human cadaver models. There is controversy regarding the ability to perform high quality manual ACD CPR in HUP. Methods: We hypothesized that high quality manual ACD CPR in HUP to specific standards is feasible.

Methods: A recording simulation mannequin was placed in HUP. After brief instruction and practice using the Zoll ResQCPRTM sys-
tem continuous ACD CPR was started by a three-member first response team. The CPR from the mannequin and the ResQPCPRM system was recorded looking at depth and decompression and continuous ACD CPR was started by a three-member team. After each of the three-member first response team. The temperature was 78.1 (6.9; 75.8–80.6)/minute and mean depth was 2.16 (0.07; 2.14–2.19) inches. 30 separate CPR effort were analyzed for beat-to-beat 30 continuous ACD HUP CPR the team members were asked to complete a survey to assess the degree of fatigue and muscle strain they experienced in comparison to standard CPR. Results: 5984 separate compressions were recorded. Mean (SD; CRIE) rate was 78.1 (6.9; 75.8–80.6)/minute and mean depth was 2.16 (0.07; 2.14–2.19) inches. 30 separate CPR effort were analyzed for beat-to-beat compliance for depth and decompression. Mean depth compliance was 78.6% (6.08%; 75.8–81.3%). Mean decompression compliance was 94.1% (1.1%; 88.0–94.8%). 10 of 10 studies reported manual ACD CPR as more fatigue than standard CPR and 9 of 10 described muscle strain. Discussion: Beat-to-beat % depth compliance fell just short of the benchmark set. The authors anticipate that with more instruction and practice the beat-to-beat depth compliance of 80% would be achieved. Conclusion: The feasibility of a quantitative analysis of ACD CPR can be done; however, it is more fatigue and causes more muscle strain than standard CPR.

98. TELEVISION AND FILM DEPICT UNREALISTIC RATES OF CARDIAC ARREST SURVIVAL

Johanna Innes, Brian Clemency, Maxwell Didams, Peter Natalizia, Deborah Waldrop, University of Buffalo Category of Submission: Cardiac

Background: The media’s portrayal of cardiac arrest management and outcomes may shape public perception of a cardiac arrest victim’s chance of survival. We sought to determine the rates of cardiac arrest survival depicted in entertainment media and television and film. We hypothesize that the survival rates portrayed on television and in movies were significantly higher than actual cardiac arrest survival rates.

Methods: We conducted a meta-analysis of existing studies of cardiac arrest resuscitations depicted on television and film. A PubMed search was conducted using the following search terms: "resuscitation and television," or "heart arrest vision and film." We hypothesized that the media’s portrayal of cardiac arrest resuscitations depicted on television and film survival to discharge rates are known, cardiac arrest survival often does not include survival to discharge information was available for studies from the CARES registry.

Results: We reviewed and compared to published data the survival to discharge information was available for studies from the CARES registry.

Conclusions: The media’s depiction of cardiac arrest survival often does not include survival to discharge information. When television and film survival was reported, the media’s depiction is significantly greater than actual cardiac arrest survival rates. This may lead to unrealistic expectations regarding out-of-hospital cardiac arrest victims’ chances of survival in the general public.

99. BENCHMARKING THE USE OF RED LIGHTS AND SIRENS IN 9-1-1 SYSTEMS: A REVIEW OF A LARGE, NATIONAL DATABASE

Jeffrey Jarvis, Dustin Barton, Lauren Sager, Nick Nudell, Williamson County EMS Category of Submission: Operations, Quality, Safety Systems, Disaster, Disaster

Background: The use of Red Lights & Sirens (RLS) in response to and from the scene of a 9-1-1 call has long been tradition in EMS, although with limited evidence of clinical efficacy. There is a growing body of evidence of the dangers of RLS and the effectiveness of priority dispatch triage for better triage of RLS responses. Little data has been published which defines the prevalence of RLS use to and from the scene. We sought to describe the proportion of RLS responses using a large national dataset.

Methods: Using an electronic review of 6 1/2 years of data from 9-1-1 consenting agencies using ESO’s Electronic Health Record (EHR) system, we identified the transport mode of all responses to and from the scene of a 9-1-1 call that resulted in transport to a hospital. The proportion of calls to and from the scene using RLS was determined, along with 95% confidence intervals.

Results: There were 7,709,012 9-1-1 calls that resulted in a patient transport. Of these, 5,846,038 (75.8%; 75.8–75.9%) involved RLS response to the scene and 1,494,378 (19.4%; 19.4–19.4%) involved RLS response from the scene to the hospital.

Conclusions: Using a large national dataset, we provided baseline information on the prevalence of the use of RLS to and from 9-1-1 calls. While we are able to assess the necessity of such response, please to the high prevalence of high-acuity 9-1-1 calls, it is possible that the 76% of RLS responses to 9-1-1 scenes could safely be decreased with appropriate priority dispatch processes. Further efforts utilizing patient outcome should assess the necessity of RLS response from the scene.

100. USEFULNESS OF EPINEPHRINE IN CARDIAC ARREST

James Hehl, Matthew Wells, Beth Langley, JE Winslow, Cape Fear Valley Mobile Integrated Healthcare Cumberland County EMS Category of Submission: Cardiac

Background: The landscape for treatment of cardiac arrest is evolving. The importance of prompt, high quality cardiopulmonary resuscitation and early defibrillation is receiving more emphasis. For decades, intravenous (IV) administration of epinephrine every 3–5 minutes has been a component of the standardized protocol for treatment of cardiac arrest, yet recent studies suggest that early IV administration could impede neurological recovery. Therefore, our EMS agency developed a “one dose epinephrine” prehospital protocol for medical cardiac arrest cases. Hypothesis: Utilizing a “one dose epinephrine” protocol will improve neurological recovery in survivors of cardiac arrest.

Methods: The protocol was revised and implemented in February 2017 to include one IV dose of epinephrine. All other components of the cardiac arrest protocol where unchanged and followed the ACLS algorithm. Each patient was closely followed through a Quality Assurance and Quality Improvement process. Data was compared from February through July 2016 and from February through July 2017, with epinephrine administered once. Evidence of neurological status was obtained from the physician discharge summary in the patient’s medical record.

Results: In the 2016 period, 134 cardiac arrest calls were identified from a total of 27,282 EMS calls. Thirty-three patients achieved with epinephrine administered once. Three of the 33 patients survived to be discharged home with no documented neurological deficits. In the 2017 period, 134 cardiac arrest calls were identified from a total of 27,572 total EMS calls. Thirty-nine patients achieved ROSC with 8 surviving to discharge. Seven of the 99 patients survived to be discharged with no documented neurological deficits.

Conclusions: The number of patients who received the “one dose epinephrine” protocol and achieved ROSC increased by 18% in 2017 compared to 2016. With no documented with neurological deficits increased from 30% in 2016 to 87.5% in 2017. Conclusions: Utilization of the “one dose epinephrine” protocol resulted in significant improvement in the percentage of victims who survived a medical cardiac arrest with no documented neurological deficits.

101. ASSOCIATION BETWEEN INITIAL BLOOD GLUCOSE IN OUT-OF-HOSPITAL CARDIAC ARREST AND RETURN OF SPONTANEOUS CIRCULATION

Caitlin Howard, Hattie McAvinney, David Wampler, Jeremy Allen, Justin Smith, David Miramontes, Joan Polk, United States Army, LTHSCSA Category of Submission: Student, Resident, Fellow

Background: Elevated blood glucose is associated with poor outcomes in patients resuscitated from out-of-hospital cardiac arrest (OHCA). In this study, we evaluate whether initial blood glucose level in OHCA patients is associated with the return of spontaneous circulation (ROSC). Methods: This was a retrospective review of a registry containing details of each resuscitation attempt by a large, urban fixed-wing EMS agency. The primary outcome was the presence of diabetes was much higher than the national average (14.2% vs. 9.3%). Data from January 1, 2016 through August 15, 2016 was analyzed. Patients were included in the study if the following variables were available: age, gender, initial blood glucose, and outcome (no ROSC vs. ROSC). Patients were excluded if age > 47, no gender, or initial blood glucose recorded, multiple blood glucose crossings 200 mg/dl, or no outcome recorded. Only the initial blood glucose obtained at the onset of resuscitation was considered. Patients were divided into two groups: blood glucose < 200 mg/dl and blood glucose > 200 mg/dl.

Results: 620 patients were included in this study. Mean age was 64.23 ± 17.20 years with 385 males (62.10%). 435 patients (73.08%) had an initial blood glucose recorded. 167 patients (26.94%) had a glucose level > 200. Of the patients with glucose ≤ 200, 171 (37.75%) obtained ROSC. Among the patients with glucose > 200, 63 (37.72%) obtained ROSC. There was no association between blood glucose levels and achievement of ROSC (P = 0.10).

Conclusions: We found no significant association between initial blood glucose levels in OHCA patients and likelihood of achieving ROSC.
Conclusions

No paramedic reported clinical deterioration of patients, and 24.7% had no clinical change. Resuscitation Checklist: Duration and Outcomes of midazolam in behavioral emergencies can be via IM (42.2%), IN (41.1%), IV (16.5%), and 1 mg (11.8%), 5 mg (72.3%), and 10 mg (15.1%) to 390 patients. Median age was 33 (IQR 24–41) years. In 37 patients, a second administration of midazolam was administered in 435 instances included, and any patient receiving midazolam for once as needed, and to record the response to treatment. Patients receiving midazolam for the indication of “behavioral emergency” were included, and any patient receiving midazolam for “seizure” were excluded. Descriptive statistics were used to report results, and Spearman’s rho was calculated to determine correlations. Overall, the total midazolam was administered in 435 instances to 390 patients. Median age was 33 (IQR 24–50) years; 69.0% were male, and 53.1% were African American. A total of 1 mg (11.8%), 5 mg (72.3%), and 10 mg (15.1%) via IM (42.2%), IN (41.1%), IV (16.5%), and IO (0.2%) routes. In 37 patients, a second dose was administered, the same dose (rho = 0.84, p < 0.0001) and route (rho = 0.68, p < 0.0001) as the first administration was common. Paramedics reported slight or substan- tial improvement in clinical condition in 75.5% of patients, and 24.7% had no clinical change. No paramedic reported clinical deterioration in a patient’s condition following midazolam administration. A protocol using midazolam in behavioral emergencies can be successfully implemented in a large urban EMS system. Midazolam successfully treated agita- tions, and paramedics did not feel that patients’ clinical conditions worsened after midazolam administration.

103. TERMINATION OF RESUSCITATION

104. QUALITATIVE EVALUATION OF COMMUNITY PARAMEDIC CARE TRANSITIONS INTERVENTION COACH TRAINING

Background: TheCareTransitions Intervention (CTI) has potential to improve the emergency department (ED)-to-home transition for older adults. Community paramedics may function as the CTI coaches instead of nurses who traditionally serve in that role. To do so requires that the community paramedics possess the appropriate knowledge, skills, and attitudes, which are not inherently part of traditional EMS education. The purpose of this study was to evaluate an expert-panel developed training program for community paramedics serving as CTI coaches who support the ED-to-home transition. Methods: This study is a component of an ongoing two-centered randomized controlled trial evaluating a community paramedic-implemented CTI to enhance community for ED discharge, and community paramedics. After start- ing the study, we conducted audio-recorded semi-structured interviews with community paramedics in both cities (June–July 2017). After transcribing the interviews verbatim, trained members independently performed preliminary coding. Ensuing group data analy- sis sessions led to the development of final codes and thematic generalizations recurrent in the interviews. Results: All eight participat- ing community paramedics were inter- viewed. Of the paramedics, five were male and all were non-Hispanic whites. The mean age was 43. Participants had varied extensive backgrounds in healthcare, primarily as EMS providers, but minimal experience with community paramedicine. All reported some previous CTI training; however, results from the interviews: (1) certain characteristics make coaches more likely succeed in this program; (2) active rather than passive learning may achieve the best results for community paramedic CTI training; (3) training program components require minor refinements; and (4) continuing education should more effectively address the paramedic coaches’ evolving needs.

105. EMERGENCY MEDICAL SERVICES RESPONSE TO MASS SHOOTING AND ACTIVE SHOOTER INCIDENTS, UNITED STATES, 2014–2015

Matthew Szatkynskyer, Aaron Klassen, Morgan Marshall, Mengtao Dia, N Clay Morgan, Mayo Clinic Department of Emergency medicine Category of Submission: Trauma

Background: According to Federal Bureau of Investigation statistics, the number of active shooter incidents has increased over the past decade. The purpose of the current study was to describe the EMS response and interven- tions to mass shooting and active shooter incidents. Methods: Retrospective analysis of 2014 and 2015 National Emergency Medical Services Information System datasets. Date, time, and location for mass shoot- ing incidents were obtained from the open source Gun Violence Archive and then corre- lated with NEMSIS data. Active shooter incidents were identified through FBI data. A de-identified database was generated for final analysis. Results: A total of 608 mass shooting were identified, of which 19 were classified as active shooter incidents. Mean number of injured victims was 4.6 ± 2.5, while mean number of fatalities was 12.2 ± 2.2. NEMSIS data identified 652 EMS activa- tions to 226 unique incidents; 5 were active shooter incidents. 76% of victims were male. 80% of victims were African American. The mean age was 27.7 ± 11.1 years. Dispatch com- plaint was reported as not known or unknown problem/man down in 14.6% of records. The predominant response configuration was AEM (78.8%). Volunteer services responded to 7% of events. The most commonly reported incident locations were Street/Highway (38.2%), Home/Residence (32.4%), and Trade/Service (11.5%). Location of wounds included head (38%), chest (9%), and head (9%). Tourniquet use was documented in 6% victims. Gun- shot wound was self-inflicted in 14.6% of vic- tims. When present, cardiac arrest occurred after EMS arrival in 37.5% of cases. 35.9% of victims were transported to the closest facility. Conclusions: Mass shooting and active shooter incidents are prevalent in the United States, with an average of 5.8 victims per incident.
Despite the fact that extremity wounds were the most common injury noted, suggesting a role for bleeding control, documented EMS tourniquet use was uncommon. While mass shooting events pose high risk for responders, dispatch information was lacking in 96% of records. Reporting EMS agencies were diverse and included BLS providers and volunteers, emphasizing the need to ensure all EMS providers are prepared to respond to mass shootings.

106. WHEN DOGS FLY: USE OF AIR MEDICAL SERVICES TO TRANSPORT OPERATIONAL K9s INJURED IN THE LINE OF DUTY

Chelsea Hogan, Chadd Nesbit, Department of Emergency Medicine, Penn State Milton S. Hershey Medical Center Category of Submission: STUDENT, RESIDENT, FELLOW

Background: Instances of operational K9 air medical transports have been documented in the popular press. There have been no studies to look at the prevalence of such transports or to determine what policies flight programs have in place to address this challenging task. We sought to assess the prevalence of operational K9 transports as well as existence and content of protocols to conduct such a transport should one be deemed necessary.

Methods: We distributed a survey to air medical programs in the United States via the Research Electronic Data Capture (RED-Cap) program. Programs were identified using the Air Medical Resource Exchange of Air Medical Services (ADAMS). Programs that could not be reached via email were excluded. A survey containing up to 23 questions inquiring about K9 transports, policies and procedures was emailed to 295 identified programs.

Results: We received 147 total survey responses (49.8% response). Twenty-two programs (15%) reported receiving a request to transport a K9 and of those, 15 reported flying the K9. Forty-one K9 transports were reported. Smaller numbers of programs reported having any additional training related to care or transport of operational K9s or a pre-designated emergency veterinarian. Six programs reported carrying some type of equipment for use on K9s and 7 programs reported carrying some type of equipment related to care or transport of operational K9s.

Conclusions: Partnership between Municipal Fire/EMS agencies and K9 Ownership Programs to respond to mass shootings.

109. DUPLICATE PROCEDURES AND CHARGES ASSOCIATED WITH PEDIATRIC INTER-FACILITY TRANSFER FROM EMERGENCY DEPARTMENTS

Ali Aledhaim, Jan Mark Hirshon, Jennifer Fishe, Jennifer Anders, University of Maryland Department of Emergency Medicine Category of Submission: PEDIATRIC

Background: Interfacility Transfer (IFT) of patients with emergency conditions from an Emergency Department (ED) delays definitive care and burdens the patient with potentially harmful duplicate procedures and extra charges. This physical and economic hardship may be preventable if patients are taken to a definitive care facility for their initial destination. Objective: To determine duplicate procedures and charges sustained by pediatric patients undergoing IFT for patient admission after an ED visit to a different facility. Methods: This study utilized three years (2010-2012) of Maryland HCUP ED and inpatient visit data. A modified probabilistic linkage was performed to identify ED patients who were dispositioned to IFT and admitted to a distant facility. Included patients were 0-17 years of age with any of the 20 most Common Diagnosis Categories (DxC) and whose conditions were classified ‘emergency’ or ‘urgent’. At linkage, duplicate procedures were identified and classified as administrative or clinical. Multiple regression analysis was used to compare the average total charges of IFT patients, including duplicate charges, to non-IFT admitted patients presenting with the same top 20 DxC. Results: Of the 9,447 IFT inpatients identified, 2,557 patients (27%) had one of the 20 most common DxC, of which 1713 (76%) had one of the top 20 DxC. The most frequent administrative duplicate procedure was ER MTALTA emergency medical screening (1,407). Notable duplicate clinical procedures recorded were chest X-ray (239) and CT scan of head (97) or body (32). IFT patients incurred an average total charge of $11,786.61 including in average a duplicate charge of $1,627.84. In comparison, the average charge incurred by a non-IFT was $8,209.72. Adjusting for the effect of age, gender, race, a weighted regression model estimated an average 34% (30.1–37.6%, p < 0.001) increase in total charges for an IFT patient compared to a non-IFT patient.
pared to a non-IFT patient. Conclusions: Both safety hazards (radiation exposure) and significance and variance in the treatment of patients undergoing IFT from an ED for inpatient admission to a distant facility. EMS systems can minimize this inefficiency and burden by implementing training to definitive care facilities whenever feasible.

110. CLINICAL EVENTS IN PREHOSPITAL PATIENTS WITH ST-ELEVATION MYOCARDIAL INFARCTION TRANSPORTED TO A PCI CENTER BY BASIC LIFE SUPPORT PARAMEDICS IN A RURAL REGION

Pierre-Alexandre LeBlanc, Sylvain Bussières, François Bégin, Alain Tangay, Jean-Michel Paradis, Denise Hébert, Richard Fleet, Département de Médecine d’Urgence – Université Laval, Québec, Canada

Background: Rural areas have limited hospital staff and often rely on basic life support (BLS) paramedics for inter-facility transport. No previous study has established whether ST-segment elevation myocardial infarction (STEMI) patients treated in an acute care center over long distances are at risk of suffering from clinical events such as bradycardia or hypotension. The objective of this study was to establish clinical events, and to determine if the complications occurring in the presence of BLS paramedics are influenced by the transportation time. Methods: In a retrospective cohort study, we reviewed 896 consecutive STEMI patients transported by paramedics. Patients had continuous electrocardiogram (ECG) and vital signs transmitted by paramedics. Patients had continuous electrocardiogram (ECG) and vital signs transmitted by paramedics. Patients had continuous ECG monitoring during transport. A focus group discussion of clinical events, and to determine if the complications occurring in the presence of BLS paramedics are influenced by the transportation time. Results were analyzed via several 2 sample t tests using 0 as the standard landmark. The average distance from the landmark on the heart was 5.06 cm. Seventy-five percent of the mean distance from the landmark on the heart was 4.3 cm. The average from the tibia was 4.13 cm (95% CI: 3.6–5.10). Both were statistically significant with a p value of <0.0001. Results: These results show a low accuracy among EMS providers in identifying correct landmarks for intraosseous needle placement. This suggests additional training and skills review may be needed across the state in order to safely perform this procedure.

113. PARAMEDIC RECOGNITION AND MANAGEMENT OF ANAPHYLAXIS IN THE PREHOSPITAL SETTING

Rakesh Gupta, Krystyna Samoraj, Simeerpan Sandhanwalia, Matt Kerslake, Luke Ryan, Colleen Shortt, Michelle Welsford, McMaster University, Category of Submission: Student, Resident, Fellow

Background: Anaphylaxis is a life-threatening condition that paramedics are equipped to treat effectively in the field. Current literature suggests improvements in paramedic recognition and management of anaphylaxis during inter-facility transport. The aim of this study was to compare the proportion of cases of anaphylaxis appropriately treated with epinephrine by paramedics before and after a targeted educational intervention. Methods: This was a retrospective medical records review of patients with anaphylaxis managed by primary or advanced care paramedics in five emergency medical services in Ontario, before and after an educational module was introduced. This module included education on anaphylaxis diagnosis, recognition, treatment priorities, and feedback on the recognition and management from the before period. All paramedic call records (PCRs) coded as “local allergic reaction” or “anaphylaxis” during 12-month periods before and after the intervention were reviewed by trained data abstractors to determine if patients met an international definition of anaphylaxis. The details of interventions performed by the paramedics were used to determine primary and secondary outcomes. Results: Of the 600 PCRs reviewed, 99/120 PCRs in the before period were correctly identified as anaphylaxis (p = 0.96). Epinephrine was administered in 33/60 (55%) of anaphylaxis cases in the before period and 76/136 (56.3%) in the after period (p = 0.70). Anaphylactic patients with only two-system involvement received epinephrine in 20/45 (50.0%) cases in the before period and 45/93 (48.4%) in the after period (p = 0.86). Conclusions: There are gaps in paramedic recognition and management of anaphylaxis, particularly in cases of two-system involvement. These gaps persisted after the implementation of an educational intervention. Other quality interventions and periodic refreshers may be necessary to improve prehospital treatment of anaphylaxis. Limitations include an increase in overall cases and decrease in rate of true anaphylaxis in the after period, which may be related to better case ascertainment or electronic PCR implementation and changes in paramedic recognition.

114. NATIONAL DESCRIPTION OF PATIENT REFUSALS FOLLOWING PREHOSPITAL ADMINISTRATION OF NALENONE

Mirinda Gormley, Juan Lu, Virginia Commonwealth University, Category of Submission: Medical

Background: Endotracheal intubation in prehospital airway management has been a focus of research and debate for decades. Endotracheal intubation is performed using a variety of techniques, including manual intubation, cricothyroidotomy, and tracheotomy. The extent to which DAI is incorporated in statewide treatment protocols (STP) has not been described. The majority of states have STPs that are either mandatory or serve as a guide for medical directors. The purpose of this investigation is to describe the extent to which STPs include DAI and the variability in pharmacopeia utilized. Methods: Cross-sectional study of STP utilizing a standardized review of all prehospital protocols. Protocol revision date was also captured. Results: Thirty one out of fifty states (64%) issue STPs, seven (22%) of which serve as guidelines. BSI is included in the majority of STPs (58%). Sedative-only intubation is included in the STP of 5 states (16%). The most commonly included induction agents are etomidate and midazolam (19 STPs each, 61%); other induction agents include ketamine (11 STPs, 35%), fentanyl (2 STPs), and propofol (1 STP). Succinylcholine is the most commonly included paralytic (17 STPs, 55%); rocuronium (11 STPs, 35%) and vecuronium (7 STPs, 23%) are other approved paralytic agents. 16 states (52%) permit intubation of both adult and pediatric patients while 6 states (19%) only allow DAI of adult patients. All protocols have been revised within the past 5 years and 75% of protocols were revised since 2015. Conclusions: The NAEMS position statement on endotracheal intubation recommends the use of a paralytic during DAI, as it increases the likelihood of first pass success. Just over half of all STPs allow for DAI, and 16% allow for sedation-only intubation. The NAEMS position statement on DAI. There is significant variation in both the induction agent as well as the paralytic utilized for intubation across STPs. There is also variation in the number of states that allow for both adult and pediatric intubation. Additional research is needed to determine optimal agents and protocols for prehospital intubation.

112. ASSESSMENT OF INTRAOSSEOUS NEEDLE PLACEMENT BY EMS PROVIDERS

Alexandra Petrie, Jeffrey Lubin, Penu State College of Medicine, Category of Submission: Operations, Quality, Safety, Systems, Disaster, Disaster

Background: Intraosseous (IO) needle placement can be used to provide quick delivery of various medications. Particularly, in cases in which venous access is compromised; however, if done incorrectly, it can lead to unwanted complications such as extravasation of fluid, injury to the bone and/or soft tissue. The purpose of this study is to see if EMS providers can adequately locate the correct sites for IO needle placement. Methods: We assessed the accuracy of intraosseous placement by asking EMS providers from a statewide conference to simulate where they would use an intraosseous needle on standardized patients. Each participant also filled out a demographic survey that included their experience with intraosseous needles and a knowledge of acceptable EZIO intraosseous needle landmarks from a list of options. Measurements were established on live human models using transfer paper with stickers placed at designated IO spots, marked so that they easily lined up with the model via landmarks. The participant was asked to place a sticker directly on the model where they would intubate the bone at both locations. Afterward, a transfer sheet with the sticker placed at a location correlating with standard placement was compared against the participant’s placement. Differences in placement were measured with a ruler to the nearest half centimeter. Distance was qualitatively noted. Numbers were assigned to each participant so that there would be no tying of the EMR to location, survey location, and sticker location could be linked to each individual subject (N = 30). Results: Results were analyzed via several 2 sample t tests using 0 as the standard landmark. The average distance from the landmark on the humerus was 5.06 cm. Seventy-five percent of the mean distance from the landmark on the humerus was 4.3 cm. The average from the tibia was 4.13 cm (95% CI: 3.6–5.10). Both were statistically significant with a p value of <0.0001.
Background: Emergency medical services (EMS) personnel deliver naloxone to reverse doses, but have difficulty. However, EMS personnel may experience challenges with patient care, including being unable to convince a patient to be transported to the hospital. Without agreeing to the appropriate follow-up care these patients could overdose again. Objectives: To describe and compare the epidemiologic features and outcomes among patients with anaphylaxis-associated OHCAEs according to causative agents group. Methods: We identified emergency medical service (EMS)-treated anaphylaxis-associated OHCA patients from a nationwide OHCA registry between 2008 and 2015. We compared epidemiologic characteristics and outcomes according to the causal agents and evaluated temporal variability in anaphylaxis-associated OHCA incidence. The rate of survival to discharge was compared among causative agents groups using multivariate logistic regression analysis. Results: During the study period (8 years), a total of 224 anaphylaxis-associated OHCAEs were included in the analysis. Notably, the ingestion of sting foods and iatrogenic agents group were 32 (14.3%). There was significant variability in the frequency of anaphylaxis-associated OHCAEs per hour of the day (p value < 0.01) and season of the year (p value < 0.01), with the highest incidence occurring during the daytime (7:01 am to 3 pm) and in the summer (June to August, 48.7%). Compared with natural agents, the adjusted odds ratios (AORs) for survival to discharge in iatrogenic agents were statistically insignificant (AORs: 3.61, 95% CIs 0.86 to 15.06). Conclusions: There was significant temporal variability in the incidence of anaphylaxis-associated OHCA, with its peak during the summer and limited OHCA by natural agents accounted for the greater proportion of anaphylaxis than iatrogenic agents but there was no difference in survival to discharge between the two groups.

118. RELATIONSHIP BETWEEN ADULT BODY MASS INDEX AND ANTICIPATED FAILURE RATE OF NEEDLE DECOMPRESSION USING A 5CM NEEDLE FOR TENSION PNEUMOTHORAX

John Lyng, Kristin Pokorney-Colling, Michaela West, Gregory Beilman, North Memorial Health Ambulance and Air Care Category of Submission: Trauma

Background: Tension pneumothorax is a traumatic injury that can rapidly lead to respiratory collapse and death. Emergent needle thoracotomy can quickly treat tension pneumothorax, but the best anatomic location and catheter length necessary to perform the intervention has been questioned in the recent years given the increasing rates of obesity in our population. Methods: We conducted a retrospective review of a convenience sample of all trauma patients admitted to our level 1 trauma center in Minneapolis, MN that underwent chest computed tomography (CT) during their admission between 2011 and 2012. Using these CT radiographs, chest wall thickness was measured bilaterally at the 2nd intercostal space (ICS) at the midclavicular line, and at the 4th and 5th intercostal spaces at the anterior axillary line. Baseline demographic data including age, sex, BMI, ISS and associated chest wall trauma were collected from medical chart review. Needles with 5cm, based on the length of commonly used needle decompression needles. Results: A total of 141 patients that met our inclusion criteria were identified. There were no significant differences in mean weight of CWT at any of the anatomic sites. CWT was similar between males and females. BMI > 30 was
associated with an adjusted odds ratio of 13.8 (Confidence interval 4.8–39.9) for failure with a standard 5cm catheter needle decompression.

**Conclusions:** In the increasingly obese general population, needle thoracostomy with a standard 5cm catheter needle may be more prone to failure. The researchers suggest using a 10 cm catheter needle as a significant predictor for anticipated failure of needle tube decompression. Alternative anatomic sites for needle decompression did not appear to increase the anticipated success of the intervention.

119. **Evaluating the Incorporation of a Journal Club Series into Paramedic Initial Education**

Lauren Maloney, Paul Werfel, Robert Marschall, Scott Steinman, Stony Brook University Dept of Emergency Medicine Category or Submission: Student, Resident, Fellow

**Background:** Given Paramedic National Standard Curriculum cognitive objectives, we developed an 8-hour curriculum that guides educators and paramedic students (PS) through the scientific process and offers a simple way to find and evaluate research articles. We then evaluated its effect on PS perception of finding and evaluating research articles, and their interest in participating in future prehospital research studies.

**Methods:** PS participated in four 2-hour long journal club sessions. First, the educators introduced four types of articles and highlighted differences between formats. Next, PS used search engines to fact check references of a free open access article. Third, PS sent articles on a topic selected by the class to the educator, who facilitated a discussion of several articles after a short statistics lecture. Finally, PS found an article on a topic of their choice (verbally presented as it was if telling their partner about it between calls. Before and after the module, PS completed a survey with demographic questions and a series of affective domain questions, with surveys linked using unique identifiers. PS will receive a follow-up survey in one year.

**Results:** A total of 21 PS participated. 81% were male, with an average age of 24, 43% were college graduates. Before the module, 76% of PS could identify a research article, 29% had a journal subscription, and many read articles several times a month (38%) or yearly (20%). By questionnaire, five-point Likert scale responses that were converted to numeric responses (strongly disagree = 1, strongly agree = 5) and analyzed using a paired t-test for significance. After the module, PS had significantly more agreement that they could find, research articles (p < 0.01) and are interested in attending a future journal club (p < 0.02). PS significantly disagreed more that the potential for damage of a defibrillator during DSD was a risk for shock vectors.

**Methods:** To assess shock efficacy, defibrillation pads were applied in lateral-lateral (LL) and anterior-posterior positions in 10 anesthetized pigs. Episodes of electrically-induced VF were treated with a shock of a block-randomized therapy. Shock energy was chosen to yield approximately 25% success for a single LL shock. We compared LL stacked shocks (i.e., a failed LL shock was repeated) and seven DSD shock intervals (Overlapping; 10, 50, 100, 200, 500, 1000 ms apart), with n = 81 VF episodes per therapy. To assess the potential for damaging a defibrillator, two sets of pads were applied in six different configurations (either approximately parallel or approximately orthogonal defibrillation vectors). Ten 360 J shocks were delivered from one set of pads while the voltage across the second set of pads was measured. We compared the voltage coupling ratio (VCR): ratio of the measured voltage to the delivered voltage. **Results:** Compared to stacked LL shocks, DSD shocks that were Overlapping, 10, and 100 ms apart significantly increased efficacy (p < 0.05). In addition, shocks 200, 500, and 1000 ms apart were different. During DSD potential damage assessment, voltage of delivered shocks was 1.83(±5) V and voltage across the second set of pads ranged from 1.2 to 503 V; parallel vectors resulted in significantly higher VCR compared to orthogonal vectors (15.2 ± 0.6% vs. 1.61 ± 0.2%, p < 0.0001). **Conclusions:** The efficacy of orthogonal-vector DSD is highly dependent on time between shocks and can increase, decrease, or not change compared to stacked shocks on a single vector. Potential for defibrillator damage during DSD can likely be minimized by choosing non-orthogonal defibrillation vectors.

121. **Biometric Analysis of Thoracolumbar Movement during Ambulance Transport**

David Wampler, Ronald Stewart, Rena Summers, Lawrence Roakes, Mike Shown, Craig Cooley, Chetan Kharod, Tasia Long, Brian Eastridge, The University of Texas Health Science Center at San Antonio Category of Submission: Trauma

**Background:** Within the community of trauma surgeons, emergency medicine physicians and emergency medical services (EMS) providers responsible for the care of injured patients, there is mounting concern that the long spine board (LSB) does little to reduce spinal motion, and that risk outweighs benefit. The purpose of this study was to evaluate the movement of the thoracolumbar spine during ambulance transport, comparing different patient positions with and without LSB. The hypothesis was that transport on a mattress with the head of the bed elevated would limit thoracolumbar movement more effectively than a LSB. **Methods:** This was a randomized 10-treatment adult healthy volunteer crossover trial. Real-time 3D motion analysis of the thoracolumbar region was measured using a wireless motion tracking system. Positions analyzed were zero, 1.5, and 4.5 degrees inclination, and on EMS stretcher with head elevated to 10, 30, 45, and 60 degrees. All subjects were fitted with a rigid cervical collar (c-collar) and had headblocks on LSB. Subjects on stretcher without LSB were fitted with a c-collar and were transported with and without foam headblocks. Each subject underwent simulated ambulance transport over a city street course at, or below, posted speed limits. The driver was blinded to the subject position. **Results:** Adult BMI > 35 was a significant risk factor for injuries on LSB and no LSB respectively. There was no statistical difference in three-dimensional volumetric movement of the thoracolumbar spine (2 ± 0.6 mm LSB, 4.7 ± 5.3 mm no LSB). The position that allowed the lowest mean volume of spinal movement were: head elevated to 10 degrees and 30 degrees with headblocks and headblocks adhered to the stretcher (1.5 mm and 0.9 ± 0.5 mm3, respectively). **Conclusions:** In healthy volunteers thoracolumbar spinal motion was limited in all groups and not contingent upon use of LSB. These data support the assertion that the long spine board is not superior for immobilization, and that more investigation should be performed to evaluate optimal thoracolumbar immobilizations.

122. **Supraglottic Airway Utilization vs Endotracheal Intubation Pre/Post Deployment of the i-gel LMA**

John Lyng, Michael Perlmutter, Alex Trembley II, Marc Conterato, Michaela West, North Memorial Health Ambulance and Air Care Category of Submission: Operations, Quality, Safety, Systems, Disaster

**Background:** Identify changes in invasive airway management using supraglottic airways (SGA) and endotracheal intubation (ETI) as primary and secondary interventions following transition from the King LTS-D to the i-gel LMA in an EMS setting. **Methods:** This is a retrospective observational study in a US-based ground/air EMS performing 86,000 transports annually. Charts documenting an attempt at invasive airway placement over a 12 month period were abstracted for age, gender, airway indication, type(s) of invasive airway device(s) attempted, number of placement attempts, and placement success. Two cohorts were defined: cohort “K” represent King LTD and cohort “I” representing i-gel LMA. ETI was continuously available. Primary endpoint was number of ETIs successfully placed and potentially superior for immobilization, and that more estimates were utilized. **Results:** A total of 660 charts were abstracted, 259 cohort K and 401 cohort I. Age (57.5 ± 21.9y), and gender (63.5% male) were consistent across cohorts (p = 0.07 and 0.81, respectively). Acuity was similar across cohorts. SGAs were the primary device in 1.9% of cohort K and 37.9% of cohort I, and the secondary device in 10.4% of cohort K and 10.2% of cohort I. Success for first device was ETI 84.0% and SGA 40% in cohort K, and ETI 80.1% and SGA 92.7% in cohort I. Final success for any device in cohort K was ETI 87.3%, SGA 11.1%, and in cohort I was ETI 54.6% and SGA 44.7%. Successful airway management was achieved using an invasive device at 94.2% in cohort K and at 98% in cohort I (p = 0.015). **Conclusions:** Deployment of the i-gel LMA improved invasive airway management in this EMS service, achieving a 4% increase in success rate. Final analysis was performed on 351 charts. Introduction of the i-gel resulted in an increase in use of SGAs as a primary device, and neut effect on use of SGAs as a secondary device. Despite successful adherence to the strategy of airway management by any device improved following i-gel deployment, erosion of ETI skills is identified as a potential collateral effect that requires surveillance.
Background: Patient satisfaction is a key indicator of healthcare quality. Community Paramedic programs are an emerging profession and as such is there is limited data on patient satisfaction with CP programs. Hypothesis: Patient satisfaction after a 30-day post-discharge community paramedic program report high satisfaction with both the program and the care provided by the CP. Methods: Inpatients with a discharge diagnosis of CHF were offered post-discharge home visits by a CP for up to 30 days after discharge. Inclusion criteria required that the patient was a local resident, not eligible for home health services upon discharge, diagnosis of CHF, English speaking, and written, informed consent to home visits by a CP. The CP visited the patient in the home 1–2 times per week for 4 weeks following discharge. At the final visit the patient was surveyed to assess their satisfaction with the program. Scoring ranged 1–4, 1 being “very dissatisfied” and 4 being “very satisfied.” Mean and median scores from the Likert scale were analyzed and are reported descriptively. Results: A total of 59 patients completed surveys regarding their satisfaction with the program. Mean scores for each question were as follows: willingness to listen carefully to the patient (4.0), time taken to answer patient questions (4.0), amount of time with the patient (4.0), exact things in a way the patient could understand (3.95), instructions regarding medication and follow-up care (3.97), thoroughness of the examination (4.0), advice given on ways to stay healthy (3.94), and overall satisfaction level (4.0). 100% of patients responded they would recommend the community paramedic service to others. Conclusions: Patients provided overwhelmingly positive feedback on the CP program. Patient’s open responses included: “I was glad that they were here the first day that I got out of the hospital.” When I got out of the hospital I was just so messed up, I had all these drugs and stuff, and she went through them and got everything worked out. It made a huge difference, so overwhelming to just have that time.” This study is limited by the small sample size. We hope to maintain these results as the program continues.

Methods: A statistically significant increase in Likert scores was found in all categories from pre-training to completion of all phases. The study found a possible cumulative effect of phases 2 and 3 for FT and FP, suggesting a benefit of simulated calls to review of PMC calls alone. The statistically significant increase in test scores demonstrated an increase in PMC knowledge from the training. One pack of a consistent patient population due to EMT schedules. Further research should provide the training over one day to ensure consistency.

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unsuccessful on the national paramedic certifi-
cation examination on their first attempt. The proportion of graduates who do not retest, despite available attempts, is unknown. The objective was to describe paramedic gradu-
ates who do not retest and their associated characteristics. We hypothesized that few grad-
uates chose not to retest and retesting was not associated with specific candidate character-
istics. Methods: We conducted a cross-sectional evaluation of the national paramedic certifi-
cation examination results for the class of 2013. This computer adaptive test terminates when the 95% confidence interval surrounding the true score of the candidate’s ability is entirely above or below the passing standard. Test length ranged from a minimum of 80 to a max-
imum of 150 questions. Unsuccessful testers were defined as candidates who had a grade of fail or incomplete (did not finish the examina-
tion) on their first examination attempt. Grad-
uates of military only training programs were excluded. Chi-square tests, Wilcoxon Rank Sum test, and two tailed independent t-test were used to compare demographics and individual performance on the examination between successful and unsuccessful testers. Results: In 2013, 11,090 paramedic graduates attempted the national paramedic cognitive examination for the first time with an overall pass rate of 73%. Paramedic graduates who were unsuccessful were likely to be maximum length testers (38%, N = 1,148) than minimum length testers (29%, N = 892). Most graduates who were unsuccess-
sful were female (76%, N = 2,697). There was no clinically significant difference in the median age (28 vs. 29 years, p = 0.156) or race/ethnicity (white, non-Hispanic 88% vs. minority 9%, p = 0.706) of students who chose to retest. Female students (86%, N = 734) were less likely to retest than male students (90%, N = 1,915, p = 0.001). Conclusions: The majority of graduates who were unsuccessful on their first attempt retested on the national paramedic cog-
nitive examination with female graduates hav-
ing lower retest rates. This study was limited by the lack of graduate specific information con-
cerning their reasons for retesting. Future stud-
ies will need to focus on the individual charac-
teristics with which affect whether graduates chose not to retest.

128. Interaction Effect between Bystander Cardiopulmonary Resuscitation and Community Urbanization Level on Outcomes after Out-of-Hospital Cardiac Arrest

Jeong Ho Park, Young Sun Ro, Sang Do Shin, Kyung Jun Song, Ki Jeong Hong, Soo Jeong Ho Park, Young Sun Ro, Sang Do

Arrest Outcomes after Out-of-Hospital Cardiac Arrest

Background: Positive association between bystander cardiopulmonary resuscitation and outcomes of out-of-hospital cardiac arrest (OHCA) are reported. There are various differ-
ces of sociodemographic and EMS factors between rural areas and urban areas. The aim of this study was to investigate whether the effect of bystander CPR on outcomes after OHCA differed by urbanization level of community. Methods: This study was a cross-sectional study of a prospective EMS registry based OHCA registry in Korea. We included adult witnessed OHCA patients with presumed cardiac etiol-
ogy from 2013 to 2015. Primary outcome examined was bystander CPR categorized into 3 groups: bystander CPR with dispatcher assistance, bystander CPR without dispatcher assistance, and no bystander CPR. The secondary outcome was good neurologic recovery at discharge. We compared outcomes between bystander CPR group using multivariable logistic regression with an interaction term between bystander CPR and urban-rural (Rural vs. Urban). Results: Among 108,253 patients, 53,528 patients were included. 49.1% received bystander CPR (12.8% without dispatcher assistance, 55% in bystander CPR with dispatcher assistance, and 50.9% received no bystander CPR. Good neurological recovery rate was 5.0% in bystander CPR with dispatcher assistance, 5.5% in bystander CPR without dispatcher assistance, and 2.2% in no bystander CPR group. In the interaction model, the adjusted OR of bystander CPR for good neurological recovery was 4.82 (95% CI: 3.25–7.27) without dispatcher assistance and 2.84 (95% CI: 1.82–4.46) with dispatcher assistance. Conclusions: The effect of Bystander CPR and DA-CPR was more prominent in rural areas than urban areas.

129. A National Description of the Use of Continuous Positive Airway Pressure in the Prehospital Setting

Rebecca Cash, Remle Crowe, Jeremiah Kins-
man, Madison Rivard, Dave Bryson, Gamunu Wijetunge, Ashish Panchal, National Registry of Emergency Medical Technicians Category of Submission: MEDICAL

Background: The use of continuous and bilevel positive airway pressure (CPAP/BiPAP) is lim-
ited to paramedics under the 2007 National EMS Scope of Practice Model. However, state and local practices may vary and current national trends of CPAP/BiPAP use by other EMS licensure levels is unknown. Our objec-
tive was to describe use and outcomes of CPAP/BiPAP use by EMS licensure level nationally. We hypothesized that basic life support (BLS) only agencies use CPAP/BiPAP with similar patient outcomes compared to agencies with advanced life support (ALS) capability. Meth-
ods: Using the 2012–2015 National Emergency Medical Services Information Systems (NEM-
SIS) datasets, we evaluated all records with CPAP/BiPAP use documented by EMS profes-
sionals in attempts to achieve return of sponta-
aneous circulation versus a response with a combination of BLS and ALS (ALS-BLS). Only 911 responses were included. Variables assessed included patient and response details, initial procedures performed, and cardiac arrest occur-
rences. Chi-square tests were used to evalu-
ate differences between BLS-only and ALS-BLS responders. Results: There were 259,099 cases of CPAP/BiPAP use documented during the study period. Of these, 253,728 (98%) were per-
fected by services with ALS-BLS responders. Most patients were 70 years or older (78%) and 49% were male. The most common inci-
dent locations were residences (65%) and health care facilities (20%). The proportion of patients treated by BLS-only responders who suffered cardiac arrest after EMS arrival was signifi-
cantly greater (4% vs. 0.5% for ALS-BLS respon-
ders, p < 0.001) with a concomitant increase in the proportion of chest compressions (BLS-
only: 4%, ALS-BLS: 1%, p < 0.001). BLS-only response agencies more frequently upgraded to lights and sirens during transport (7%) than ALS-BLS responders (0%). Conclu-
sions: Use of CPAP/BiPAP by EMS agencies with BLS-only response occurred in 2% of cases. BLS-only responders had more cardiac arrest events after EMS arrival than ALS-BLS responders, although the reasons for this find-
ing require further evaluation beyond the scope of this dataset, the urban-rural location and patient population served. This evaluation likely underestimates the use of CPAP/BiPAP by BLS practitioners since the dataset is unable to separate combined BLS-only and ALS-BLS responders. Further work is needed to understand the trends of CPAP/BiPAP use by EMS professionals.

130. Association Between BMI and Return of Spontaneous Circulation in Out-of-Hospital Cardiac Arrest

Caitlin Howard, Jeremy Allen, David Wampler, Hattie McAviney, Justin Smith, David Miramontes, Joan Folk, United States Army and UTHSCSA Category of Submission: STUDENT, RESIDENT, FELLOW

Background: Sudden cardiac arrest (SCA) con-
tinues to be the leading cause of death in the U.S. Current studies suggest that there is no strong correlation between BMI and resusci-
tation rates. The objective of this study was to evaluate what effect BMI has on the rate of return of spontaneous circulation (ROSC).

Methods: This was a retrospective review of an in-house cardiac arrest registry containing details of each resuscitation attempted by a large, urban fire-based EMS system. Data was analyzed from January 1, 2016 through August 30, 2016. An electronic query would fail to cap-
ture all possible patients (SCA). We conducted a cross-sectional study of all SCA patients with complete data on BMI and other relevant covariates, all of which were included in the analysis. The mean age of the subjects was 65.08 ± 17.96 years with 319 (61.82%) males, 64 (12.40%) patients were underweight, 224 (43.41%) patients were normal weight, 168 (32.56%) patients were over-
weight, and 60 (11.63%) patients were mor-
bidly obese. There was no statistically signifi-
cant difference in outcome (no ROSC vs ROSC) between the BMI categories (P = 0.37). Con-
ditions that BMI did not have an effect on rates of ROSC in this study. Our study did have limitations. First, BMI was a subjective measure and not calculated. Second, the data is from a single system cardiac arrest data and may not be extrapolated to other systems.

131. Paramedics Providing Palliative Care at Home: Management of Pain and Breathlessness

Brianne Robinson, Alix Carter, Judah Gold-
stein, Michelle Harrison, Marianne Arab, Dal-
house University Category of Submission: STUDENT, RESIDENT, FELLOW

Background: Palliative care is aimed at allevi-
at the pain and distressing symptoms by offering support. Paramedics routinely respond to palliative patients and can assist with symp-
tom relief. In Nova Scotia, a novel clinical procedure was implemented enabling paramedics to assist families with home med-
ications, collaborate with on-scene home care teams, or to administer opiates through an exemption from formal exemption. Our goal was to study the paramedic activities, collaborations, and the impact on the departmental mission practice for the management of pain and breathlessness. Methods: We conducted a ret-
rospective review of 100 consecutive palliative care responses from February 8, 2015 to June 30, 2016. An electronic query would fail to cap-

treatment assistance with home medications; a manual chart review including standard medication adherence. The first two protocols were conducted to fully capture the care provided. Descriptive analysis was conducted and results were reported with n and % and standard deviation. Results: Study protocols included 94 unique patients; 6 patients had 2–4 calls and the remaining had one. Paramedics administered medication to 58 (58%) patients, and ketamine was administered to 28 (28%) patients. Only one patient (1.0%) had more than one medication administered. Most common CC was pain; despite this, only 36 (36%) patients received treatment and 6 (6%) patients received post-treatment. Only 28 (28%) patients received medications. Paramedics assisted with home medication 10 (17.2%), administered from drug kit 47 (77.6%) and both 3 (5.2%). Mean oral morphine equivalent was 13 ± 7.5 mg.

Contact with an Online Medical Physician (OLMP) occurred during 57 encounters, and was increased when medication was administered 46 (79.3%) compared to no medication 11 (26.2%). Conclusions: Medication administration would be underestimated in an electronic questionnaire without inclusion. Encounter with home medications, management of pain and breathlessness may not be optimized. Pre- and particularly post-medication pain scores were used for management of pain. Contact with OLMP when paramedics were not going to administer medication should increase administration and non-transport through increased comfort and confidence.

132. Ketamine Indications in Statewide Treatment Protocols

Christie Fritz, Christina Loporcaro, David Scoville, Beth Israel Deaconess Medical Center/ Harvard Medical School Category of Submission: Student, Resident, Fellow

Background: Ketamine was discovered in the 1960s, and since that time has been used for multiple indications including pain control, procedural sedation, induction, depression, and excited delirium/behavioral disturbances. Ketamine has a more favorable hemodynamic profile than many of its alternatives for management of pain and breathlessness. It can be administered through the intravenous, intraosseous or intramuscular routes. The purpose of this investigation is to describe the overall prevalence of ketamine use and the indications for which it can be utilized. Methods: Cross-sectional study of STPs for inclusion of ketamine in any protocols. Protocol revision date was also captured. Results: Thirty-one out of fifty (62%) states issue ketamine for induction during rapid sequence intubation, and five states (16%) allow ketamine for procedural sedation. Six states (19%) include ketamine in their pain control protocols. Eight states (26%) have excited delirium protocols which include the use of ketamine. One state also includes ketamine as an agent for shivering. 60% of states which include ketamine in their protocols only allow its use for one indication. 75% of protocols have been revised since 2015 and all have been revised within the past 5 years. Conclusions: Ketamine is included in nearly every protocol and is included in a variety of applications in prehospital care. Despite this, less than half of STPs include ketamine in the program, and the majority had those that include it have limited indications. Ketamine is a hemodynamically stable option for pain control or induction for RSI, but a majority of STPs include ketamine for these indications. Ketamine has had a recent resurgence in emergency medicine, although as most protocols have been revised in the last 3 years, it is unlikely that protocol revision timing has been a barrier to ketamine adoption into STPs. Further study is needed to examine the barriers to introduction and indication expansion of ketamine in STPs.

133. Manual Syringe Aspiration and Administration of Epinephrine by Emergency Medical Technicians for Prehospital Treatment of Anaphylaxis

Andrew Latimer, Sofia Husain, Jonathan Nolan, Vinod Dosswamy, Thomas Rea, Michael Sayre, Olga Korikova, Robert Silcox, Jeffrey Harwood, John Martel, Michael Bohanske, J. Kelly Meehan-Coussee, Abhijit Sunnarapu, Thomas Rea, Michael Sayre, Mickey Eisenberg, Beth Israel Deaconess Medical Center/ Harvard Medical School Category of Submission: Student, Resident, Fellow

Background: In recent years, the costs of epinephrine autoinjectors (EAI’s) in the United States have risen substantially. In 2014, emergency medical services within a large urban/suburban county in the United States implemented the “Check and Inject” protocol to treat emergency medical technicians (EMTs) to manually aspirate epinephrine from a single-use 1 mg/mL epinephrine vial using a needle and syringe followed by administration of the medication. The purpose of this study was to evaluate the impact of the protocol on treatment of patients with anaphylaxis or serious allergic reaction. Treatment was guided by an EMT protocol that required a decision based on patient symptoms. We sought to determine if the “Check and Inject” protocol was safely implemented by EMTs treating presumed prehospital anaphylaxis or serious allergic reaction. Methods: We conducted a prospective investigation of all cases treated as part of the “Check and Inject” program from July 2014 through December 2016 in the suburban aspects of the County. Results: Of the 411 cases eligible for analysis, 301 (73%) patients met inclusion criteria with a greater number treated in the post-protocol implementation period (34 vs. 14). A statistically significant increase in the proportion of patients treated with oral epinephrine in the prehospital setting was noted following protocol implementation (0% vs. 47%, p = 0.002). This was associated with a significant decrease in the proportion receiving prehospital IVs (100% vs. 65%, p = 0.01) and prehospital IV ondansetron (100% vs. 53%, p = 0.002). Significant changes in other prehospital interventions (p = 0.521) or ED interventions (p = 0.741), length of stay (p = 0.253), hospital admission rates (p = 0.161), and 48-hour ED return visits (p = 0.254) were not observed. Conclusions: The results of this study suggest that the availability of prehospital oral epinephrine increases the frequency of anaphylactic use, decreasing the need for vascular access and improving patient comfort. An increase in other interventions, hospital admissions, or return ED visits was not observed. Despite concern that oral epinephrine may mask a medical surgical emergency, this study suggests that pediatric patients treated with oral epinephrine are not at increased risk of symptom-masking and subsequent return ED visits.

135. Use of a Community Paramedicine Program to Address High Utilizers of the 9-1-1 System

Thomas Graway, Mario Coletta, Steven Rieg, Michael Wright, Medical College of Wisconsin Category of Submission: Student, Resident, Fellow

Background: The role of community paramedics (CP) has been expanding over recent years. Many programs exist across the country, attempting to meet the unique needs of the local community. The Milwaukee Fire Department (MFD) has created a CP program which addresses high-utilizers of the 9-1-1 system. CPs attempt to improve patients use of resources and improve patient quality of life. Objective: To determine if enrolling high utilizers of the 9-1-1 system in a one month community paramedicine program can improve use of community paramedicine program. Methods: This is a retrospective chart review. Data from MFD’s program in 2014 was reviewed. Patients who had used high rates of care were enrolled in the program, varying from 2-8 patients per month. Data was available and analyzed based on month of enrollment in the program. The data collected from the patients enrolled were reviewed with the 6 months prior to participation compared to...
6 months after the program was completed. Total hours of community paramedic contact time were computed for 784 paramedics. Ten patients were excluded because they dropped out of the program prior to completion. Results: In all 9 months of implementation there was a drop in medical contact among the 6 months after completion of the program. August par-
ticipants saw the least change, where 5 patients who reported a total of 54.1 CP work hours saw a decrease from 18 to 13 runs over a 6 month period (−28%). In July there was the largest drop in 9-1-1 usage of 77% (48 to 11), during which time 4 patients were enrolled and 43.6 contacts were observed. In July and August there were a total of 47 patients enrolled in the pro-
gram accounting for 337 calls pre-intervention and 149 calls (−36%) after 419.8 total hours of CP care were performed. For every 27 minutes of care provided, one less 9-1-1 call occurred.

Conclusions: Participation in a community paramedicine program established to decrease 9-1-1 utilization cut by use was 56%. Limitations include lack of information about nature of 9-1-1 calls including which calls required hospital transport. A future study could look at cost savings provided by the program.

136. Understanding How Transactional Stress Results in Post Mortem Safety Reactions and Safety Outcomes

Elizabeth Donnelly, Paul Bradford, Cathie Hedges, Matthew Davis, Doug Socha, Peter Morassutti, University of Windsor CATEGORY OF SUBMISSION: OPERATIONS, QUALITY, SAFETY SYSTEMS, DISASTER

Background: Increasing attention is being paid to the impact of stress and fatigue on safety in paramedicine. Specifically, empirical linkages have been established between fatigue, chronic work stress, critical incident stress, and safety outcomes. However, the relationship between transactional stresses, stress reactions like post-
traumatic stress, fatigue, and safety outcomes (safety compromising behaviours, medication errors and adverse events, and injuries or expo-
sures) have not been assessed. There are two types of transactional stress. Internal transactional stresses are associated with the day to day functioning of paramedics, while external transactional stresses are associated with being placed on standby, dealing with dispatch, inappropriate use of EMS, mandatory over-
time, and dealing with frequent service users.

Methods: Among paramedics with AHLS Level 4 (n=136), 136.0% had dedicated hazmat medication kits and 505 (64.4%) had hazmat medications carried with other medica-
tions for managing Hazmat events. For those hazmat medications with haz-
mat uses only, availability/use of each hazmat medication is reported using simple descriptive statistics, including number and percent (%). Hazmat medications were con-
sidered to have been used if the surveyed paramedic gave them anytime in the last five years.

Results: Of the 4,360 surveys sent, 784 (18.0%) were completed. Of the completed sur-
evies, 279 (35.6%) paramedics had dedicated hazmat medication kits and 505 (64.4%) had hazmat medications carried with other medica-
tions. For those hazmat medications with haz-
mat uses only, availability/use was: cyanide antidotes 463 (59.1%) / 36 (4.6%), atropine + pralidoxime auto-injectors 376 (48.0%) / 5 (0.6%), pralidoxime multi-dose vials 122 / (15.6%) / 3 (0.4%), and methylene blue 103 (13.1%) / 5 (0.6%). The availability/use of hazmat medications with other uses was: atropine 513 (65.4%) / 63 (8.0%), calcium chloride 540 (68.9%) / 100 (13.5%), calcium gluconate 247 (31.5%) / 2 (0.3%), diazepam 498 (63.5%) / 49 (6.3%), lorazepam 262 (33.4%) / 18 (2.3%), midazolam 619 (79.0%) / 29 (3.7%), topical ophthalmic topical anesthetic 13 (1.8%) / 3 (0.4%), and topical lubricating jelly 462 (58.9%) / 28 (3.6%).

Conclusions: Among paramedics with AHLS®, Provider training has limited availability and use of hazmat medications. Although local hazard med-
pharmacists have used this model for analysis, the results of this study suggest that there is a need for further research to understand the impact of stress and fatigue on safety outcomes in paramedicine.

137. Prehospital Availability and Use of Medications for Managing Hazmat Emergencies

Kubwimana Mhyamaguru, Amber Bel-
lafore, Eric Lederer, Carl Youngs, Robert French, JoshonKlaassen, Frank Walter, The University of Arizona CATEGORY OF SUBMISSION: STUDENT, RESIDENT, FELLOW

Background: A minimal amount is known about prehospital availability and use of med-
ications to treat hazardous materials (hazmat) emergen-
ces. The purpose of this study was to identify the availability and use of hazmat medications among paramedics with advanced hazmat training, practicing in prehospital set-
tings in the United States (U.S.).

Methods: An email Qualtrics® survey was sent to U.S. paramedics who completed the Advanced Haz-
mat Life Support (AHLS®) Provider Course from 1999–2017. The survey asked what spe-
cific hazmat medications were available to each respondent, what they had used, and how frequently they had been used. For analysis, responses were grouped into those medic-
tions with hazmat indications only and those with multiple uses. Availability and use of each hazmat medication is reported using simple descriptive statistics, including number (n) and percent (%). Hazmat medications were considered to have been used if the surveyed paramedic gave them anytime in the last five years.

Results: Of the 4,360 surveys sent, 784 (18.0%) were completed. Of the completed sur-
evies, 279 (35.6%) paramedics had dedicated hazmat medication kits and 505 (64.4%) had hazmat medications carried with other medica-
tions. For those hazmat medications with haz-
mat uses only, availability/use was: cyanide antidotes 463 (59.1%) / 36 (4.6%), atropine + pralidoxime auto-injectors 376 (48.0%) / 5 (0.6%), pralidoxime multi-dose vials 122 / (15.6%) / 3 (0.4%), and methylene blue 103 (13.1%) / 5 (0.6%). The availability/use of hazmat medications with other uses was: atropine 513 (65.4%) / 63 (8.0%), calcium chloride 540 (68.9%) / 100 (13.5%), calcium gluconate 247 (31.5%) / 2 (0.3%), diazepam 498 (63.5%) / 49 (6.3%), lorazepam 262 (33.4%) / 18 (2.3%), midazolam 619 (79.0%) / 29 (3.7%), topical ophthalmic topical anesthetic 13 (1.8%) / 3 (0.4%), and topical lubricating jelly 462 (58.9%) / 28 (3.6%).

Conclusions: Among paramedics with AHLS®, Provider training has limited availability and use of hazmat medications. Although local hazmat pharmacists have used this model for analysis, the results of this study suggest that there is a need for further research to understand the impact of stress and fatigue on safety outcomes in paramedicine.

138. Validation of a Prehospital Falls Risk Assessment Tool

Allison Infinger, Meghan Wally, Rachel Sey-
mour, Jonathan Studnek, Mecklenburg EMS AGENCY CATEGORY OF SUBMISSION: TRAUMA

Background: Every 15 seconds an older adult will present to the emergency room with a fall related injury. Falls have demonstrated efficacy; however, health care providers must be able to identify at risk patients. This study aimed to develop a con-
tent valid and reliable assessment of environ-
mental fall risk performed in the prehospital setting. Methods: First, we identified validated items for screening extrinsic factors from the lit-
erature. Then, a multidisciplinary expert panel completed two rounds of assessment using con-
tent validity index (CVI) scores to eliminate items. The remaining items were revised for predefined use and were presented to experts for val-
ors for clarity, relevance, and feasibility. The draft assessment tool was deployed for field testing with two paramedics to determine the feasibility and frequency of item identification. Following descriptive analysis and structured interviews, a second field test was conducted with a revised tool. Paired crews completed the assessment independently on low acuity patients whose home they entered. Pair agreement on the final tool was measured using Cohen’s kappa.

Results: A total of 67 items measured extrinsic factors with one round of content validity testing eliminated 33 items (CVI ≤ 0.76). 22 items were condensed or removed due to redundancy. Round two elim-
inated another 6 items (CVI ≤ 0.70). Twenty-
eight items were included in the initial EMS assessment and items with CVI scores ≤ 0.70 (n = 4) were eliminated. Twenty-two items were deployed for field testing. Round one of field testing (n = 12) revealed paramedics infre-
cently accessing the kitchen (41.6%), bath-
room (0.0%), or bedroom (25%) and excluded roundspecific items. Five items were eliminated in re-
paired assessments in round two using a nine-
item tool. One item (k = 0.8721) returned a high level of agreement, whereas the remain-
ing items showed low to moderate agreement (k = 0.3322–0.5369). Conclusions: A nine-item, content-valid, prehospital falls risk assessment tool was created using a standardized process. After two rounds of field testing, the tool is not yet highly reliable. It is hypothesized that the low agreement is due to the variation in priori-
ted providers on scene. Future study included field test the accuracy of extrinsic factor identification among secondary care providers only.

139. Development of a Hypoxic Asphyxial Model of Pseudo-Pulsless Electrical Activity in Swine

Norman Paradis, Sarah Crockett, Jeffrey Gould, Christopher Kaufman, Karen Moodie, Dartmouth-Hitchcock Medical Center CATEGORY OF SUBMISSION: SURVIVAL CARE

Background: Pulsless electrical activity (PEA) is a potentially life threatening rhythm in cardiac arrest, particularly with in-hospital respira-
tory arrests. Pseudo-PEA (p-PEA), which often precedes true PEA, is characterized by a low cardiac output state in which cardiac arrest is de-
duced by a non-palpable blood pressure, and is diffi-
cult to treat. We set out to develop a repro-
ducible, stable, and clinically relevant animal model of P-PEA for testing novel treatments. Hypothesis: Rapid induction of a hypoxic asphyxial state will result in a reproducible p-
PEA state sufficient for study of pathophysiol-
y and therapy. Methods: A state of p-PEA was induced via progressive hypoxia in twelve domestic swine ~32 kg with standard physiolo-
gical monitoring. Blood flow was measured in the common carotid artery and jugular vein. FO2 was reduced to 6% by increasing the frac-
tion of nitrogen in inspired gas. A target systolic blood pressure (SBP) of 40 mmHg was used to mimic p-PEA. After resuscitation, the ani-
mal was stabilized. This cycle of hypoxic p-PEA and resuscitation was repeated until return of spontaneous circulation could not be achieved. Results: p-PEA could be consequent to hypo-
xic asphyxiation. In this model, p-PEA was characterized by a mean heart rate of 77 ± 16 bpm, mean aortic blood pressure of 46 ± 5 mmHg, mean right arterial pressure of 14 ± 2 mmHg, mean carotid flow of 48 ± 16 ml/min, mean jugular flow of 10 ± 5 ml/min, and mean intracranial pressure of 2 ± 1 mmHg. To achieve target systolic blood pressure was sig-
ificantly less in the second round, however
the physiological responses were similar for both rounds. **Conclusions**: A reproducible, stable, clinically- and porcine-derived model of p-PEA via hypoxic asphyxiation was developed. Time to induction was reduced after multiple insults. This model offers an improved method for testing innovative therapies for p-PEA.

140. CHARACTERISTICS OF ACUTE MYOCARDIAL INFARCTION CASES CODED AS LOW-ACUITY AT DISPATCH

Marie Gardett, Greg Scott, Chris Olola, Meghan Broadbent. International Academies of Emergency Dispatch Category of Submission: CARDIAC

**Background**: Identification of acute myocardial infarction (AMI) can be complicated by the wide variety of symptomologies or presentations. While the most common symptom of AMI is chest pain, so-called “atypical” presentations are in fact quite common and extremely variable, and AMI sometimes presents with very mild-seeming symptoms such as flulike chills and nausea, abdominal pain, or lightheadedness. Correctly identifying mild-seeming presentations that actually turn out to be AMIs can help ensure appropriate response and treatment. This study identified hospital-confirmed AMI cases coded as low-acuity to determine whether any common characteristics could help identify these cases in the future. **Methods**: This was a retrospective study utilizing emergency medical dispatch (EMD), emergency medical services (EMS), and hospital discharge datasets. The study sample included all cases that arrived to the hospital via EMS. Primary outcome measures were the numbers of hospital-diagnosed AMIs categorized by patient age and gender, Chief Complaint Protocol, and dispatch determinant code; secondary measures were comparisons between EMD- and EMS-recorded symptoms. Descriptive statistics were used to characterize the distributions of all ALPHA-level cases and of ALPHA-level AMIs, categorization by hospital discharge destinations, and Chief Complaint. Results: A total of 8,007 ALPHA priority-level cases with corresponding hospital records were identified. Of these, 469 (5.8%) were identified as AMIs; the ALPHA-level AMI cases fell into only five Chief Complaint Protocols (Sick Person, Falls, Unconscious/Fainting, Abdominal Pain/Problems, and Miscellanea Operations). Older-age patients who were discharged to medical facility (rather than to home or self-care) were identified with AMI cases. The most commonly reported symptom was chest pain, especially chest pain with radiation. **Conclusions**: Overall, the number of AMIs attributed to the ALPHA-level priority is very low and is confined to very few Chief Complaint Protocols. In general, the ALPHA-coded AMIs in this study showed characteristics consistent with the ALPHA-level priority; these characteristics include older-age patient, certain “sick person” characteristics were also somewhat associated with AMI diagnosis. **Conclusions**: The number of AMIs identified to the ALPHA-level priority is very low and is confined to very few Chief Complaint Protocols. In general, the ALPHA-coded AMIs in this study showed characteristics consistent with the ALPHA-level priority; these characteristics include older-age patient, certain “sick person” characteristics were also somewhat associated with AMI diagnosis.

141. HEAT INDEX IS THE MAIN FACTOR INFLUENCING RATES OF PATIENT PRESENTATION AT EAST CAROLINA UNIVERSITY FOOTBALL GAMES

An Truong, Stephen Taylor, Roberto Portela, Kaitlyn Beaverton. Broady School of Medicine at East Carolina University Category of Submission: STUDENT, RESIDENT, FELLOW

**Background**: Mass-gathering events are large gatherings of greater than 1,000 people where access to patients is difficult and response by emergency medical services (EMS) may be delayed. Current literature suggests that multiple factors can influence patient presentation rates during these events. Local emergency medical services (EMS) utilized the acute medical care at East Carolina University (ECU) football games with a stadium capacity of 51,082. ECU football games are typically staffed by six EMS units including one field dedicated EMS unit, and 2 Medical Treatment Areas staffed with four physicians. Cooling tents are used as needed based on weather forecasts for the game day. **Conclusions**: This study aimed to quantify patient presentation rates and factors influencing patient presentation during ECU football games between 2008 and 2016. A retrospective review of EMD field records and 9-1-1 incident numbers originating from the stadium on the dates and times of home football games from 2008–2016 was conducted. JMP Version 13 (Cary, NC) was used to conduct a bivariate correlation analysis on the cumulative data set to determine relationships between external factors and patient presentation as well as emergency department (ED) transport rates per 10,000 attendees. Heat index, attendance, and kickoff times were the main factors evaluated. **RESULTS**: Data from 47 home football games, attendance ranging from 33,048 to 51,082 were included. The heat index during the games ranged from 37.8 to 89.6 °F. Kickoff times ranged from 1200 to 2000. A bivariate analysis of heat index and patient presentation was calculated as 0.432 (p < .05). This result suggests a positive correlation between heat index and patient presentation. The correlation between heat index and rates of ED transport was moderately positive at 0.316 (p < .05). The bivariate analysis of attendance and kickoff times with patient presentation and ED transport rates showed little to no correlation with no statistical significance. **Conclusions**: Heat index values were shown to have a moderately strong correlation with rates of patient presentation at ECU football games. There was no correlation between attendance at the football games, kickoff times, and patient presentation rates.

142. REDUCING 9-1-1 OVER-UTILIZATION THROUGH A TARGETED COMMUNITY PARAMEDIC HOSPICE REFERRAL PROGRAM

Peter Antevy, Kenneth Schepcke, Juan Cariona, Susan Toolan, Sharon Maraj, Frank Babinec, Julie Corona, Paul Pepe. Memorial Healthcare System Category of Submission: MEDICAL

**Background**: Over-utilization of 9-1-1 systems is a nationwide problem that overburdens EMS agencies and often results in hospital transports better suited for other dispositions. For example, EMS professionals often are called to attend and transport patients who likely require out-of-hospital end-of-life care, yet still have unmet healthcare needs. The purpose of this study was to evaluate if a community paramedic (CP) could successfully refer appropriate patients to local hospice partners and thereby diminish EMS responses for those patients. **Methods**: Between August 1, 2015 and December 31, 2016, front-line EMS crews, guided by established criteria, referred potential hospice candidates to a single designated CP who visited those patients at their residence then referred those patients to local hospice partner (VITAS Healthcare) for enrollment. Demographics, diagnoses, length of stay (LOS), and outcomes were collected for patients referred. Of those patients referred, the associated 9-1-1 utilization, before and after enrollment, was tracked and measured. **Results**: The CP attended 320 potential hospice patients during this period. Of the 136 patients seen in 2014, 42 (30.9%) were enrolled in hospice and, similarly, 64 of 184 (34.8%) seen in 2016 were also enrolled. Of those 106 total patients enrolled, 58 were men and 48 were women. While ranging in age from 3 to 86 years, 95.2% (n = 101) were over 68 and the main diagnoses involved included COPD, CHF, dementia and cancer. The average length of stay in hospice was 71 days and 23.5% (n = 25) of the 106 patients used their full 6-month hospice benefit. Another 11.3% (n = 12) are still enrolled. The total number of 9-1-1 responses for this cohort (prior to hospice enrollment) had been 439. This fell to 17 after enrollment (a 96.1% reduction in related EMS utilization). **Conclusions**: Based on this experience, it is recommended that paramedic programs can play a very important role in facilitating the care of hospice-eligible patients and thus help to avoid unnecessary EMS system utilization for such patients. Appropriately educated of front-line EMS professionals, working in conjunction with a designated CP, can reduce unneeded 9-1-1 utilization, but, more importantly, facilitate the most appropriate and expert care and transport through hospice-partner resources.
Background: Minimizing scene times for patients with critical trauma has long been recommended. Additionally, pain from traumatic injuries is very common. Assessment and management of this pain has been identified as a key clinical performance measure by the EMS Compass Initiative. There has been little prior national data to benchmark these measures. We sought to describe the performance on these measures using a large commercial dataset.

Methods: Using anonymous data from 94-1 consented EMS agencies, we analyzed 6.5-years of data from ESO Solution’s electronic health record (HER) to calculate benchmarks for: (1) the percentage of patients with trauma tourniquets applied, measured by the CDC trauma triage criteria for transport to a trauma center who have a scene time under 10 minutes, and (2) of patients with any traumatic injury, the proportion with at least one pain score documented. For those with an initial pain score ≥5, the proportion with a second score reassessing pain. Of patients from scene times under 10 minutes, the proportion with an initial score ≥5, the proportion with decreased pain from the first to last pain score. We calculated the proportion and 95% Confidence Interval as well as average, median and interquartile range (IQR) for time-based measures.

Results: Of the 66,414 critical trauma patients, 16,162 (24.3%, 20.4–27.6%) had a scene time less than 10 minutes. EMS tourniquets were used in 16,483 (25%, 23.9–26.6%), IQR 14(7,10,20). Of 2,166,680 trauma patients, 1,053,747 (48.6%, 46.8–48.7%) had a pain score documented. Of 503,656 patients with initial scores of ≥5, 305,493 (60.7%, 59.6–61.8%) had a reassessment. Of the 310,737 patients of ALS agencies with a score ≥5, 64,076 (20.6%, 20.5–20.8%) had an improvement in pain scores.

Conclusions: We provide the first benchmarks on critical trauma scene times and pain management using a large national dataset. The results indicate additional efforts are needed, both for improving transport times as well as pain and in addressing it. Additionally, scene times on critical patients are rarely under the “platinum” 10 minutes, indicating either need for improvement or a more realistic goal.

145. STOP THE BLEED: THE EFFECT OF HEMORRHAGE CONTROL EDUCATION ON LAYPERSONS’ WILLINGNESS TO RESPOND DURING A TUMOURNQUET APPLICATION

Derek Brown, Elliot Ross, Theodore Redman, Julian Mapp, Kaoi Tanaka, Chetan Khorado, Craig Cooley, David Wampler, SAIHSCE Military Medicine and Emergency Fellowship Category of Submission: Student, Resident, Fellow

Background: The “Stop the Bleed” campaign advocates for non-medical personnel to be trained in basic hemorrhage control. However, it is not clear what type of education or the duration of instruction that is required to meet that condition. The objective of this study was to determine the impact of a brief hemorrhage control training curriculum on the willingness of laypersons to respond during a traumatic emergency.

Methods: This education initiative was conducted between SEP 1, 2014, and JUL 15, 2015, and subjects were recruited from multiple community groups in a large metropolitan area. Individuals with formal medical certification were excluded. Participants completed a pre- and post-education questionnaire assessing personal comfort levels and their knowledge and attitudes about tourniquet application in traumatic emergencies. Each training course included 20 minutes of didactic instruction on hemorrhage control techniques, encompassing indications for tourniquet application with a tourniquet application on both adult and pediatric mannequins. The primary outcome was willingness to use a tourniquet in response to a traumatic medical emergency. Results: Of 236 participants, 218 met eligibility criteria. When initially asked if they would use a tourniquet in real life 64% (140/218) responded “Yes”. Following training, 96% (212/220) participants responded that they would use a tourniquet in real life. Of participants who initially responded No (2%, 6/218), all responded “Yes” following training. Before training, men were statistically more likely to respond “Yes” to using tourniquets than women (80.9% vs. 57.1%, p = 0.003), but that difference resolved following training. When participants were asked about their comfort level with using a tourniquet in real life, there was a statistically significant improvement between their initial and post-training responses (p = 0.005, based on 5-point Likert scale, p < 0.001). Conclusions: In this hemorrhage control education study we found that a short educational intervention can improve laypersons’ disposition and reported willingness to use a tourniquet in an emergency. Significant gender differences exist in the stated willingness to respond in emergencies. Identified barriers to ALS use include, among others, when designing future hemorrhage control public health education campaigns. Community education should continue to be a priority of the Stop the Bleed campaign.

146. CAN PREHOSPITAL PROVIDERS CORRECTLY IDENTIFY CRITICAL PATIENTS FOR TRANSPORT TO A FSED WITHOUT ADDITIONAL RESOURCES

Charles Hwang, Desmond Fitzpatrick, Jason Jones, University of Florida Department of Emergency Medicine Category of Submission: Student, Resident, Fellow

Background: Freestanding emergency departments (FSEDs) are equipped to care for most emergencies but do not have the resources that hospital-based emergency departments (EDs) offer. Emergency medical services (EMS) must routinely determine whether a FSED is an appropriate destination. Inappropriate trauma transport may result in undertriage, increased mortality due to delay in definitive care. We sought to include paramedics’ ability in determining whether a FSED is the most appropriate destination.

Methods: We conducted a retrospective study of two county EMS agencies and two FSEDs over more than 2 years. Both EMS agencies allow paramedic discretion in determining transport destination; both protocols read, “Any patient potentially requiring admission in the paramedic’s best judgment (Ex. elderly, weakness, dizziness, dialysis, etc.) will be EXCLUDED and not considered eligible for transport to a FSED.” The primary outcome was whether paramedics can correctly identify patients that can be cared for fully at a FSED without additional resources. We sought to identify the percentage of patients brought to EMS FSEDs that were discharged without additional resources. Conclusions: Between January 1, 2015 and February 6, 2017, 1,247 EMS patients had a selected destination of FSED. We excluded patients that did not arrive at the destination, left before FSED disposition, or were transferred from the FSED to unaffiliated hospitals. A total of 1,184 patients were included for analysis, and 885 (74.7%) did not require additional hospital resources. Comparing the two EMS agencies yielded similar results. Of note, multiple EMS narratives revealed that paramedics transported patients to a hospital-based ED at least of a FSED because the main hospital had more resources. Conclusions: The primary goal of triage is “determining how best to get the right patient to the right place at the right time for the right amount of resources”. The burgeoning of FSEDs highlights the significance of this critical concept. As FSEDs become more popular, it is crucial for us to determine which patients are appropriate for specific emergency departments. Our study demonstrated that paramedics have a reasonable accuracy in determining which patients may be transported to a FSED and to predict the need for hospital resources.

147. OUTCOME IMPACTS OF COMMUNITY BYSTANDER DEFIBRILLATION VERSUS DISPATCHER-ASSISTED CPR (DA-CPR) IN OUT-OF-HOSPITAL CARDIAC ARREST AT PUBLIC LOCATIONS

Patrick Chow-In Ko, Shih-Chieh Huang, Yu-Wen Chen, Hong-Yi Huang, Ming Ma, Chung-Liang Shih, National Taiwan University, College of Medicine, Department of Emergency Medicine Category of Submission: Cardiac

Background: We compared the outcomes between a community-wide public-access automated external defibrillation program and a DA-CPR program in patients after out-of-hospital cardiac arrest at public sites. Methods: A prospective 2-year community-wide observational database collected from a metropolitan OHCA e-Registry was studied. After a citywide bystander defibrillation rescue program had been launched that strategically provided publicly accessible AEDs (automated external defibrillators) in designated locations that were also e-registered; and a DA-CPR program had been run. The survival outcomes of OHCA at public locations between the two program interventions were compared. Outcomes included 2-hour sustained ROSC (return of spontaneous circulation) at hospital, survival to hospital discharge, and good CPC (Cerebral Performance Category Scale 1 or 2). All patient prehospital characteristics and outcome relations were evaluated and adjusted by multiple regression analysis. Results: Mean OHCA public AEDs distribution increased from 3.96 to 6.24 per square kilometers in the studied 2 years. Among a total of 6,356 OHCA, 627 patients occurred at public locations, including 28 patients (male for 82%, witnessed arrest for 79%) received bystander aid by public AEDs plus CPR rescue and 243 patients (male for 64%, witnessed arrest for 61%) received dispatcher-assisted CPR. For these 28 patients, 53.6% (15/28) achieved prehospital ROSC at scene or during transport, 71.4% (20/28) achieved sustained ROSC, after resuscitation at hospital, 57.1% (16/28) achieved survival-to-discharge and noticeably all those 16 (100%, 16/16) had excellent neurological outcome of CPC 1 (CPC Scale 1). Their outcomes were significantly better (71.4 vs. 43.6%, OR: 3.2 [95% CI: 1.4–7.6] for sustained ROSC; 57.1 vs. 25.9%, OR: 3.8 [95% CI: 1.7–8.5] for survival of discharge; 57.1 vs 16.9%, OR: 6.6 [95% CI: 2.9–14.9] for good CPC; and 100 vs. 65.1% for good CPC among the 16 patients with the right amount of resources). Conclusions: The bystander defibrillation rescue only one man without prehospital ROSC still achieved survival-to-discharge and good CPC. For OHCA patients at public locations, we found that a community-wide bystander defibrillation program were associated with excellent neurological outcome of CPC 1 and survival to hospital discharge that
were significantly higher than those associated with dispatcher-assisted CPR program.

148. Randomized Trial of a Shear Reduction Surface in Ambulance Transport

Kathleen Berns, Ann Tescher, Lucas Myers, Patrick Koehler, Kip Salzewedel, Heather McCracken, Donald E. Russon, Josh Woterton, Christine Lohse, Jay Mandrekar, Evan Call, Scott Zietlow, Mayo Clinic Category of Submissions: Operations, Quality, Safety Systems

Background: Shear is a known risk factor in pressure ulcer formation and development such as distrubed

ulcers. The purpose of this study is to examine the effectiveness of an anti-shear mattress overlay (ASMO) in reducing shear/pressure and increasing comfort in an ambulance stretcher.

Methods: This was a randomized, cross-over design. Thirty adult volunteers in 3 BMI categories served as their own controls. PRE-DIA shear/pressure sensors were applied to

the sacrum, ischial tuberosity (IT), and heel. The stretcher was placed in sequential 0°, 15°, and 30° elevations, with and without ASMO. The volunteer rolled over a closed course achieving 30 mph, with 5 complete stops at each head of bed elevation for a total of 900 trials. Subjects rated discomfort on a 0–10 scale after each run.

Results: Peak shear difference between surfaces was −0.89, indicating that after adjusting for elevation, sensor location, BMI, starting peak shear levels were 0.89 lower for ASMO compared with standard surface (p = 0.057).

Comparison with 0°, 15° and 30° increased these levels by 2.41N (p < 0.001) and 3.44N (p < 0.001) compared to the sacrum as the reference, IT and heel had increased shear levels of 2.54N (p < 0.001) and 1.01N (p = 0.079), respectively.

Peak pressure difference between surfaces was −1.69, indicating pre-run peak pressure levels were 1.69 mmHg lower for ASMO compared with standard surface (p = 0.070).

Discomfort was lower on ASMO than standard surface at 0° and 30° (p = 0.004, p = 0.014). Both surfaces had increased discomfort moving from 0° to 30° (p = 0.005 and 0.039, respectively).

Conclusions: ASMO reduced levels of shear and discomfort when comparing transport, attention should particularly be given to the heels and head of bed elevation.

149. Sleep Disorders Are Common Risk Factors for Occupational Injury

Matthew Weaver, Jason Sullivan, Conor O’Brien, Salim Qadri, Charles Czesler, Laura Barger, Brigham and Women’s Hospital and Harvard Medical School Category of Submission: Operations, Quality, Safety Systems, Disaster

Background: The rate of occupational injury in EMS is high and crashes are common. Fatigue has been identified as an important risk factor to occupational injury. EMS providers who are vulnerable to adverse safety outcomes are key to study. We hypothesized that provider recognition and perception of threatening situations would not differ given different patient presentations or aggressors.

Methods: Using video-recorded role-play scenarios, EMS providers were asked to rate their perception of patient threat level. The scenarios included intoxicated, disruptive or hostile patients, paramedics providing Palliative Care (152), paramedics providing manual ventilation (150) and paramedics providing CPR in the field (153). The scenarios were standardized for timing (8 minutes) and distinct phases of escalation (e.g., entrance of distractor, physical contact with patient, physical contact with crew). The same 51 data elements collected. The scenarios used actors in an immersive, realistic, video-recorded environment. Role players and evaluators attended a week-long course to standardize simulation performance and assessment. Providers were told that they were participating in a “patient care scenario” but otherwise blinded to the purpose of the simulation. Each provider participated in a single scenario as a member of a team. The evaluator to participant ratio was 1:1. Characteristics were compared using chi-square tests.

Results: A total of 272 EMS providers were evaluated across three Patient simulation categories: alcoholic abuse (n = 94, 35%), possible overdose (n = 44, 16%), deceased mother (n = 68, 25%), and intoxicated homeless person (n = 66, 24%), with <3% missing data across elements. There were no differences in participant characteristics by scenario: certification levels (p = 0.96), sex (p = 0.28), and years of EMS experience (p = 0.86). Most providers felt their scenario was realistic (n = 219/265, 83%) and this rating did not differ across scenarios (p = 0.08). Overall, 63% (n = 170/269) of providers stated that if the scenario had happened in their life, they would have felt threatened, with no difference across scenarios (p = 0.31). Conclusions: We created and validated four realistic scenarios for prehospital providers that simulated threatening patient encounters with standardized phases of escalation and data collection points. Future research should focus on evaluating the characteristics of threatening patient encounters, and the phases that alert providers to the potential for violence.

150. Effectiveness of Manual Ventilation in Intubated Helicopter EMS Transported Trauma Patients

Timothy Lenz, Brett McLachlan, Craig Bilbrey, Keith Mausner, Medical College of Wisconsin Category of Submission: Trauma

Background: Helicopter EMS agencies are frequently called to prehospital settings to transport intubated patients to definitive care at a trauma center. There is current evidence to inform the decision of ventilation in this population. Current practice varies by group from hand-operated bag-valve-mask (BVM) to mechanical ventilation. Our goal was to evaluate the effectiveness of manual BVM ventilation supportive care in intubated, multiply injured trauma patients. We hypothesized that manual control of ventilation will provide adequate support to maintain a physiologic end-tidal carbon dioxide (ETCO2).

Methods: This research was designed to create and validate four realistic scenarios to assess provider responses to threatening situations. Each scenario involved patient presentations and distractors that simulated common high-stress EMS encounters. The scenarios were standardized for timing (8 minutes) and distinct phases of escalation (e.g., entrance of distractor, physical contact with patient, physical contact with crew), with the same 51 data elements collected. The scenarios used actors in an immersive, realistic, video-recorded environment. Role players and evaluators attended a week-long course to standardize simulation performance and assessment. Providers were told that they were participating in a “patient care scenario” but otherwise blinded to the purpose of the simulation. Each provider participated in a single scenario as a member of a team. The evaluator to participant ratio was 1:1. Characteristics were compared using chi-square tests.

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151. Development and Validation of Reality-Based Training Scenarios Simulating Violent EMS Encounters

Mallory Deluca, Donald Garner, Jr, Remle Crowe, Rebecca Cash, Madison Rivard, Jefferson Williams, Ansley Panchal, Jose Cabanas, Wake County EMS Category of Submission: Professional

Background: Emergency Medical Services (EMS) providers are often exposed to violence during patient encounters. Traditional EMS training may not adequately address appropriate responses to potentially threatening situations. Our objective was to develop and validate scenarios to evaluate EMS providers’ response to threatening situations. We hypothesized that provider recognition and perception of threatening situations would not differ given different patient presentations or aggressors.

Methods: Using video-recorded role-play scenarios, EMS providers were asked to rate their perception of patient threat level. The scenarios included intoxicated, disruptive or hostile patients, paramedics providing Palliative Care (152), paramedics providing manual ventilation (150) and paramedics providing CPR in the field (153). The scenarios were standardized for timing (8 minutes) and distinct phases of escalation (e.g., entrance of distractor, physical contact with patient, physical contact with crew). The same 51 data elements collected. The scenarios used actors in an immersive, realistic, video-recorded environment. Role players and evaluators attended a week-long course to standardize simulation performance and assessment. Providers were told that they were participating in a “patient care scenario” but otherwise blinded to the purpose of the simulation. Each provider participated in a single scenario as a member of a team. The evaluator to participant ratio was 1:1. Characteristics were compared using chi-square tests.

Results: A total of 272 EMS providers were evaluated across three Patient simulation categories: alcoholic abuse (n = 94, 35%), possible overdose (n = 44, 16%), deceased mother (n = 68, 25%), and intoxicated homeless person (n = 66, 24%), with <3% missing data across elements. There were no differences in participant characteristics by scenario: certification levels (p = 0.96), sex (p = 0.28), and years of EMS experience (p = 0.86). Most providers felt their scenario was realistic (n = 219/265, 83%) and this rating did not differ across scenarios (p = 0.08). Overall, 63% (n = 170/269) of providers stated that if the scenario had happened in their life, they would have felt threatened, with no difference across scenarios (p = 0.31). Conclusions: We created and validated four realistic scenarios for prehospital providers that simulated threatening patient encounters with standardized phases of escalation and data collection points. Future research should focus on evaluating the characteristics of threatening patient encounters, and the phases that alert providers to the potential for violence.

152. Paramedics Providing Palliative Care at Home: An Evaluation of Paramedic Competence and Confidence in Providing Palliative Support

Alix Carter, Judah Goldstein, Marianne Arab, Michelle Harrison, Wilma Crowell, Katherine
Background: Paramedics are called for crisis and symptom management for patients receiving palliative care. To address the mismatch between care end and the patient's goals of care, a new program was implemented in two provincial EMS systems. Prior to program launch, all paramedics were trained in the Learning Essentials Approach to Palliative Care (LEAP) Mini for Paramedics. We evaluated paramedic comfort and confidence to deliver palliative or end of life care. Methods: A participatory observation electronic survey was delivered before and 18 months after training and program launch. A total of 1,255 paramedics received an email invitation. Participants scored questions on comfort and confidence on a 4-point Likert scale, and attitudes on a 7-point Likert scale. Scores are reported as Median (IQR). Wilcoxon ranked sum tested before and after differences. Open-ended questions were thematically analyzed by one author. Results: Pre-launch, 235 (18.9%) responded; 105 were primary care paramedics (PCP) (44.7%). Post-launch, 267 responded (21.3%), 118 by (44.2%) PCPs. Paramedic comfort to provide palliative care scores improved: pre = 3 (IQR 1) to post = 3 (IQR 1) (p < 0.000099), where 4 = very comfortable. Confidence to provide palliative care without transport increased: pre = 3 (IQR 1) vs. post = 3 (IQR 1), p < 0.000001. Confidence in having the right interventions tools to deliver palliative care increased from: pre = 2 (IQR 1) to post = 3 (IQR 0) (p = <0.000001); for care without transport to hospital: pre = 2 (IQR 1) to post = 3 (IQR 1), p = <0.000001. Respondents strongly believed palliative paramedics should be able to provide good basic palliative care: 7 (IQR 6, 7) and that a patient with an incurable illness should receive palliative care: 6 (IQR 4, 7). Thematic analysis revealed paramedics feel delivering palliative care is rewarding, although additional experiential training, continued expansion of the role of PCPs and additional medications were recommended. Conclusions: The palliative care training and additional resources resulted in improved comfort and confidence. Additional support with paramedic administration of palliative care, cite palliative care as an important and rewarding part of their job, and identified recommendations for further training and scope.

153. Complications with Use of a Transport Ventilator with a King-LTD Based Peak Airway Pressure Feature

Leonard Weiss, Gabriel Diamond, Thomas Seegerson, Justin Talarico, Francis Guyette, Christian Martin-Gill, Department of Emergency Medicine, University of Pittsburgh School of Medicine Category of Submission: Medical

Background: Our prior pilot data demonstrated that mechanical ventilation during critical care transport using the King Laryngeal Tube Disposable airway (King-LTD) was associated with peak inspiratory pressures (PIP) above the manufacturer recommended 30 cmH2O in almost half of cases. In the current study, we aimed to determine prehospital and in-hospital complications associated with use of King-LTD when PIP with mechanical ventilation reached 30 cmH2O. Methods: We retrospectively reviewed all King-LTD uses with mechanical ventilation in a large multistate urban EMS system and transported service from December 2006 through November 2015. Cases of discontinuation of ventilatory efforts with King-LTD or missing PIP data were excluded. Primary outcomes were the incidence of prehos-
teams of paramedics (4–6 individuals) managed one trauma patient and one acute decompression patient. Trained EMS agency instructors and simulation center personnel used a standard scoring sheet with predefined data points evaluated teams. The primary outcome was successful endotracheal intubation. Secondary outcomes included several pre-intubation and post-intubation assessment and management steps. Descriptive statistics were summarized with median with interquartile ranges (IQR) and proportions. Results: A total of 30 patients were enrolled in 30 trauma scenarios and 73 (99%) of the heart failure scenarios. End-tidal capnography confirmation was performed in 60 (98%) of the trauma scenarios and 73 (99%) of the heart failure scenarios. Basic airway maneuvers (repositioning, suctioning) were performed in 13 (21%) of trauma scenarios and 27 (37%) of heart failure scenarios. In the heart failure scenario, allergies were reviewed in 10 (13.5%) encounters, and endotracheal tube dislodgement was recognized in 5 (7%) of the heart failure scenarios. Preoxygenation was performed in 60 (98%) of the trauma scenarios and 72 (97%) of the heart failure scenarios. Basic airway maneuvers and reviewing allergies, endotracheal tube dislodgement, and preoxygenation were performed at lower than expected rates. Developing quality improvement initiatives is challenging for low-frequency procedures. This study exemplifies the utility of airway management in helping improve quality improvement initiatives for large EMS agencies. 157. Incidences of Adverse Reactions Secondary to the Administration of Hydroxocobalamin for Suspected Cyanide Poisoning in the Prehospital Setting. Albert Arslan, Doug Isaacs, Pamela Lai, Matthew Melamed, Glenn Asada, David Prezant, Fire Department City of New York and Northwell Health Doctors Hospital, New York. Background: The objective of this study was to assess the incidences of adverse reactions secondary to the administration of hydroxocobalamin to patients with suspected cyanide poisoning after exposure to smoke inhalation. Exposure to fires involves a high morbidity and mortality, in part by the cellular asphyxiant cyanide - a byproduct of the combustion of synthetic materials. Hydroxocobalamin, one of the most common antidotes, combines cyanide to form a nontoxic metabolite. Since 2009, our department has administered hydroxocobalamin in 239 cases, creating one of the largest prehospital case series for a single agency. Methods: This is a retrospective analysis of a prehospital cohort study to determine the relationship between ETCO2 and BIS and paramedics from three agencies were trained in the administration of hydroxocobalamin and used it as early as possible during resuscitation. BIS was recorded until the patient achieved ROSC or was pronounced dead. The BIS monitor transforms the EEC waveform into a dimensionless percent range from 0 to 100 (fully awake and alert). Data was analyzed using descriptive statistics and unadjusted logistic regression. Results: Forty-two percent of patients with BIS measures were enrolled. (ROSC) was achieved in 13 patients (31%). Neither BIS at initiation of CPR was (p = 0.513) or BIS nadir (0.007) was significantly associated with ROSC. 29/40 (73%) died prior to or during transfer to the ED. BIS measures at initiation of CPR (p = 0.973) or at nadir (0.285) were not significantly associated with mortality. 2/11 patients who survived the ED transfer had BIS measures that fell below 5%. Similarly, among 40 patients with available data, ETCO2 at initiation of CPR and ETCO2 nadir did not significantly predict ROSC outcomes (p = 0.995; p = 0.285) or mortality (p = 0.028). Adverse reactions recorded included erythema, nausea, seizures, headaches, allergic reactions, or increased blood pressures. Results: A total of 99 patients were enrolled, ranging from 15 years of age to 99 years and a median age of 52 years, of whom 58% were male, were administered hydroxocobalamin. Patients in cardiac arrest comprised 36.8% of the patients studied and were excluded from analysis. For the remaining patients, one was observed to have nausea and another with post-administration seizure. An increase in blood pressure was noted in 42.4% of the patients, with a change in systolic measurements between 1–106 mmHg with a mean change of 13.9 mmHg (median 7 mmHg, SD = 17.6 mmHg) and change in diastolic measurements between 1–77 mmHg with a mean change of 19 mmHg (median 10 mmHg, SD = 24.8 mmHg). Of these patients, 7.9% experienced a clinically significant increase in blood pressure to 100 mmHg or greater than회의 저작권에 저촉하지 않는 범위 내에서 제공합니다.
adjusted grip allowed for volumes more consistent with lung-protective ventilation strategies and thus to similar strategies used with a smaller BVM. Methods: A patient simulator of a head and torso was found between these patient characteristics with the following characteristics: mean age 60.2%, oral diabetic agents 10.7%, with the pediatric BVM were more consistent with lung-protective ventilation volumes.

161. Retrospective Refinement and Validation of a Community-Dwelling Hypoglycemia Decision Tool for Paramedics

Julie Sinclair, Michael Austin, Shannon Leed, Zachary Cantor, Richard Dionne, Penny Price, Justin Maloney, Andrew Reed, Willmore, Valerie Charbonneau, Cheung, Penny Price, Joanne McGovern, James Dziju, Fangyong Li, Geliang Gan, David Cone, Sandy Bogucki, Yale University Category of Submission: MEDICAL

Background: Hypoglycemia symptoms are often treated by paramedics in the prehospital environment. Some evidence suggests that not all patients require transport to hospital following successful reversal of symptoms. We sought to refine and validate a decision tool derived to identify patients that could safely be treated and returned to the community without transport to hospital following paramedic care for hypoglycemia. Methods: We conducted a health record review of paramedic call reports and emergency department records for all patients with hypoglycemia over a 6-month period (July 1, 2015–December 31, 2015). Prehospital records were queried to identify all adult patients with a prehospital measurement of <40 mg/dL (2.2 mmol/L) excluding cardiac arrests and terminally ill patients. We used standardized case report forms to collect data. We defined short-term adverse events as hospital admission, repeat access to paramedics/ED care, or death, occurring within 72 hrs of the initial prehospital hypoglycemic event. The hypoglycemia decision tool was developed by reviewing the following variables: on insulin, not on corticosteroid/oral diabetic agent, no seizure disorder or cardiovascular disease, and given CHO/protein. We performed descriptive, logistic regression analysis and test characteristics of the decision tool. Results: There were 392 included patients with the following characteristics: mean age 57.9 years (10%-99%), diabetic 72%, not on insulin 60.2%, oral diabetic agents 10.7%, >1 paramedic encounter 18.6%, 247 (63.0%) were transported to hospital and 57 (14.5%) were admitted; 34 (8.7%) had repeat access to paramedic/ED care. A significant association was found between these patient characteristics and short-term events, renal disease, liver disease, homelessness and on chemotherapy.

162. Fall Risk Inventory by Paramedics Predicts Future Hospitalization and ED Utilization by Elders

Ryan Carter, Joanna McGovern, James Dziju, Fangyong Li, Geliang Gan, David Cone, Sandy Bogucki, Yale University Category of Submission: MEDICAL

Background: One-third of community-dwelling elders fall each year. Previous work showed that more than half of elders who fall and activate EMS for “lift assists” without transport will activate EMS again within 30 days. The objective was to determine whether several parameters assessed by a research paramedic at a scheduled home visit predict ED visits and hospitalizations within 90 days in elders at risk for falls. Methods: For this prospective study, informed consent to track future healthcare utilization was obtained, and participants were enrolled via three pathways: 9-1-1 activation for lift assist, ED visit, or self-referral. Participants had scheduled home visits by research paramedics, who assessed home safety and fall risk (a 15-item survey of yes/no questions adapted for field use from a previously validated instrument), balance, and medical disability, and by a visiting nurse, who evaluated home health needs. Subsequent healthcare utilization within 90 days after the visiting nurse evaluation was identified by querying electronic hospital records. A multivariate analysis was performed, including several of the initial “assess and intervene” elements plus race, sex, medication count, history of prior healthcare utilization, and enrollment pathway with the dependent variable being ED or hospital utilization within 90 days. Results: Of 2,265 participants, 1,521 completed their research paramedic and visiting nurse appointments, with at least 90 days of subsequent observation. The median age was 77, with 69% female, 19% black, and 11% Hispanic. 390 (25.8%) had an ED or hospital admission within the 90-day time period. In the multivariate analysis, significant independent predictors of 90-day healthcare encounters included history of prior encounter (adjusted OR 2.94, p-value <0.0001), medication count (1.06, 0.0001), and fall risk (0.91, 0.0002). In an analysis using the same variables with the single outcome of 90-day hospitalization, these factors remained significant independent predictors, with similar adjusted odds ratios. Conclusions: This study demonstrates that the fall risk inventory, along with medication count and history of previous encounter, is an independent predictor of future healthcare utilization and hospitalization within 90 days. The field-adapted fall risk inventory is a simple tool for paramedics to use to improve the EMS assessment of patients at risk of falls.

163. Factors Associated with a Good Outcome Following Pediatric Out-of-Hospital Cardiac Arrest in the Years Following the 2010 Resuscitation Guidelines

Paul Banerjee, Paul Pepe, Amninder Singh, Latha Ganti, Polk County Fire Rescue, Polk County, FL Category of Submission: PEDIATRIC

Background: To determine which factors had the strongest association with good outcomes after pediatric out-of-hospital cardiac arrest (POHCA) since 2010 when clinical practice guidelines became more aligned with those used for adults. Methods: Conducted in a large EMS urban/suburban jurisdiction that uses a comprehensive Utstein-style database, all POHCA cases occurred over 5 calendar years (January 1, 2012 through December 31, 2016) were analyzed for associated outcome correlations following full implementation of the latest (2010) international guidelines for childhood basic and advanced life support. The analysis was used to identify current predictors for return of spontaneous circulation (ROSC), hospital admission (HA) and survival to successful hospital discharge (SURV). Logistic regression models of traditional predictors were performed using JMP 12.0 for Mac. Results: Of 133 consecutive POHCA cases identified, the interquartile range (IQR) for response intervals was 16 to 47 minutes (range: 0–490) and the majority presented with asystole. As traditionally proposed, transport from arrest to EMS arrival was associated (significantly) with ROSC, HA and SURV (all p < 0.0001) whereas bystander-witnessed arrest cases (only 13%) were nearly 8 times (p = 0.0001) more likely to survive than nonwitnessed cases in 95% of the cases, the arrest was identified by a bystander prior to EMS arrival and, contrary to previous studies (with lower reported frequencies of bystander CPR), chest compressions were performed by bystanders in 59% of cases. The earlier CPR was provided by EMS personnel was itself (significantly) associated with ROSC, HA and SURV (p < 0.0001) but some form of treatment before EMS arrival was provided in 54% of cases and such actions were strongly associated with ROSC, HA and SURV (p < 0.0001 for all 3 outcomes) whereas AED placement (50% of cases) was not. Conclusions: Although “witnessed arrest” cases and AED placement were not identified as contributing factors in this subsample of cardiac arrests (likely reflecting infrequent ventricular dysrhythmia etiologies), as expected, shorter elapsed intervals from the moment of arrest to EMS arrival (performance of CPR prior to EMS arrival; and, most importantly, any treatment provided before EMS arrival, all resulted in significantly higher rates of ROSC, HA admission and survival beyond hospital discharge.

164. Adherence to Quality CPR Principles During the EMS to ED Handoff in Simulated Pediatric Cardiac Arrest

Ariel Cohen, Jen Anders, Jordan Duval-Arnould, UCSD Category of Submission: PEDIATRIC

Background: The aim of this study is to quantitatively evaluate adherence to 2015 AHA guidelines for quality CPR during the transition of patient care from EMS to ED. We hypothesized that quality would be compromised during this complicated period; as measured by pauses in chest compressions (likely reflecting infrequent ventricular dysrhythmia etiologies), as expected, shorter elapsed intervals from the moment of arrest to EMS arrival (performance of CPR prior to EMS arrival; and, most importantly, any treatment provided before EMS arrival, all resulted in significantly higher rates of ROSC, HA admission and survival beyond hospital discharge.)
166. Paramedics’ Perceptions of Focused Point of Care Cardiac Ultrasound

John Reynolds, Juan March, Roberto Portela, Steven Taylor, Bryan Kitch, Department of Emergency Medicine, Division of EMS, Brody School of Medicine, East Carolina University

Introduction: Focused Point of Care Cardiac Ultrasound (FOCUS) has been used successfully in screening for many life-threatening emergencies such as cardiac standstill, pericardial effusion, and others. There has been limited research on paramedics’ ability to perform FOCUS, but none looking at their perceptions. The purpose of this study was to evaluate paramedics’ perceptions of FOCUS before and after an educational intervention.

Methods: A prospective study was performed in a suburban/urban setting with a population of 180,000 and 26,000 EMS calls annually. Over a six month period a convenience sample of paramedics were recruited. The paramedics attended a 60 minute ultrasound lecture and practical. An emergency medicine physician trained in basic ultrasound delivered the educational intervention to the paramedics. Paramedics completed a questionnaire both before and after the educational intervention to determine their perceptions regarding FOCUS and ultrasound. The pre and post questionnaires were scored out of 20. Results were analyzed using descriptive statistics. We also compared the change in pre and post scores using paired sample t-tests.

Results: 27 (100%) paramedics completed the pre and post surveys. The mean pre-survey score was 11.1 (SD = 4.1) out of 20. The mean post-survey score was 15.1 (SD = 3.1). An increase in score of 4 (9%) was observed. The mean difference between the pre and post score was 4.0 (95% CI: 2.5–5.5) out of 20.

Conclusions: Our pilot study suggests that paramedics, through education, can be taught to perform a FOCUS using the parasternal long axis view, but may have difficulty using the subxiphoid view.
Background: “Transport PLUS” is an educational intervention in which Emergency Medical Technicians (EMTs) are trained to use a checklist to perform discharge instruction comprehension assessments and home fall safety assessments for older adult patients transported home following hospitalizations. Previously reported preliminary findings demonstrated high rates of patient acceptance and removing fall hazards following the intervention. In this qualitative study, we endeavored to identify potential barriers to success and refine the existing checklist and other modifiable aspects of the program in order to maximize its effectiveness. Methods: This qualitative study consisted of two homogenous focus groups led by an experienced facilitator with Transport PLUS trained EMTs and potential older adult patients to assess barriers and opportunities for improving the program. Three independent analysts coded anonymous transcripts for themes, compared for consistency, and resolved disagreements through discussion. Results: Trained EMTs and potential patients found the program valuable but uncovered a number of potential barriers that require the development and improvement of strategies to address. Themes identified by both groups included concerns for patient privacy and the importance of obtaining buy-in from both patients and families. Training EMTs also suggested improving phrasing of items on the checklist and optimizing delivery of educational information. Patient focus group suggested ways to enhance comprehension. Suggested improvements included emphasis on situational awareness during EMT training, building rapport, question order, normalizing safety measures, and removing the assumption behind including and excluding specific items on the checklist. Conclusions: The Transport PLUS program was well received by both EMTs and patients. We found a high degree of agreement between the two groups in identified barriers to success. Adjustments in EMT training and support materials, including checklists and handouts, were recommended. Suggestions obtained during the focus group interviews. Training was specifically enhanced to emphasize quality, safety, decision making skills and teamwork. Documents were enhanced to be more visually appealing, easier to understand, and promote better flow throughout the encounter. A robust protocol revision is a key for assuring effectiveness of the program is already underway. If successful, our program will reduce the burden of preventable injuries and readmissions on frontline providers and health care systems.

170. AM I AWARE? LACK OF SEDATION PROTOCOLS FOR INTUBATED PATIENTS DURING TRANSPORT IN STATEWIDE TREATMENT PROTOCOLS

Christina Loporcaro, David Schoenfeld, Beth Israel Deaconess Medical Center/Harvard Medical School Category of Submission: STUDENT, RESIDENT, FELLOW

Background: We investigated sedation protocols for intubated patients during interfacility transport (IFT), as well as the use of standardized sedation assessment scoring to guide sedative medication administration. Methods: Two retrospective chart reviews of STPs utilizing a standardized review to evaluate sedation protocols for intubated patients and the use of standardized sedation assessment scoring to guide sedative administration was also captured. Results: Thirty-one out of fifty states (62%) issue ALS STPs. Of those thirty-one states, only one (3%) has a protocol for sedation of intubated patients. No STP incorporate rates or references any sedation scoring tool to help guide sedative administration or aid in patient assessment. 75% of protocols have been revised since 2015 and all have been revised within the past 5 years. Conclusions: Although there is little in the prehospital literature regarding patient outcomes with respect to inadequately sedated patients, self-extubation, excessive agitation on hospital arrival and vital sign abnormalities are complications well known to providers. This study demonstrates that current STPs do not provide parameters with the tools to optimally assess and sedate intubated patients in the out of hospital environment. While sedation plans may be developed with medical control prior to transport, a protocolized approach to sedation scoring and medication administration may be beneficial. This represents a serious deficiency in our ability to provide high quality care to patients in the out of hospital environment. In the future, we hope to develop and validate a prehospital sedation scoring model and associated protocol for the management of intubated patients in the out of hospital environment.

171. PREVALENCE OF RECURRING PATIENT ENCOUNTERS THAT REQUIRE ADMINISTRATION OF PREHOSPITALNALOXONE: A RETROSPECTIVE CHART REVIEW

Thomas Dykstra, Jen Knapp, Patrick Dugan, Rhees Nickel, City of Fort Wayne, EMS Foundation Chair Category of Submission: STUDENT, RESIDENT, FELLOW

Background: A significant proportion of patients responded to by EMS personnel for opioid overdose will continue to abuse opioids after treatment and resuscitation, leading to subsequent encounters that require additional treatment. The aim of this study is to identify the prevalence of recurrent encounters that require the administration of Naloxone to reverse opioid overdose. The prevalence of opioid abuse within the United States has continued to increase despite efforts to decrease their accessibility. To deter this issue, stricter guidelines regarding opioid use and the use of naloxone in pain management have been implemented. The use of naloxone has led many individuals with addiction to seek illicit substances. The major health concern of opioid abuse, respiratory depression has been treated mainly with Naloxone, which counteracts opioids at the receptor level. It is thought by many EMS personnel that people experiencing resuscitation with Naloxone will continue to abuse opioids. Methods: A retrospective chart review examined electronic patient care reports provided by the Three Rivers Ambulance Authority (TRA). All encounters in which Naloxone was administered between November 1, 2010 and October 31, 2016 by TRA or other bystanders were examined. The number of encounters each patient had during this data period was used to analyze a general recurrence rate of opioid use. Results: The increase in number of individuals experiencing more than one Naloxone related event annually did not differ significantly from what was expected over the 6-year range, $x^2 = 9.81$, $p = 0.08$. However, the number of patients falling into this category increased more than triple throughout the study. Conclusions: The results of this study suggest that the number of recurrent patient encounters involving the administration of Naloxone has increased. While the extent of the increase is relatively small, it is much less than initially believed by EMS personnel, additional future studies to correctly identify the impact of recurrent patient encounters may show significant results to assist combating addiction.

172. PHARMACOLOGIC OPIOID ALTERNATIVES FOR PAIN CONTROL IN STATEWIDE TREATMENT PROTOCOLS

Christie Fritz, Christina Loporcaro, David Schoenfeld, Beth Israel Deaconess Medical Center/Harvard Medical School Category of Submission: STUDENT, RESIDENT, FELLOW

Background: There has been an increasing focus on reducing opioid use across healthcare in light of the opioid epidemic. There are multiple pharmacologic options for treating pain in the prehospital setting including ketamine, nitrous oxide, acetaminophen, ibuprofen, ketorolac and aspirin. The majority of states issue statewide treatment protocols (STPs) that are either mandatory, or serve as a guide for medical control. The purpose of this investigation is to describe the extent to which STPs include alternatives to opioids for pain control. Methods: Cross sectional study of STPs, utilizing a review of pharmacopeia in pain control protocols. Protocol revision date was also captured. Results: Thirty-two of fifty states (64%) issue STPs; 78% are mandatory; 38% of STPs limit pain management to opioid medications only; and 62% of STPs provide for pharmacologic alternatives to opioids for pain management. Pharmacologic alternatives for pain control are variable across STPs and include Nitrous oxide (50%), ketamine (19%), Tylenol (25%), ketorolac (25%), Ibuprofen (16%), and aspirin (6%). A total of 75% of protocols have been revised since 2015 and all have been revised within the past five years. All ALS statewide treatment protocols have explicit orders for opioids in their pain control protocols. Conclusions: The opioid epidemic in the U.S. has led to an increased focus on the use of alternatives to narcotic medications in healthcare. Pain management remains an important patient safety concern; however many states do not provide pharmacologic alternatives to narcotic medications. While many states have identified the need for medical administration as a cause of or contributor to the opiate epidemic, we should strive to reduce the use of narcotics when appropriate alternatives exist. Despite the mixed going protocol revisions within the last two years which is during the ongoing opiate epi...
Background: Obesity is an epidemic in this nation and provides serious challenges to EMS for care and transport. Many systems have identified the problem, but few provide a solution to their providers. Alternatively, EMS systems should create a solution that is deployable, cost effective, and provides safe dignified transport. We describe the characteristics of a regional Bariatric Support Unit (BSU) transport system dispatched via the 9-1-1 system for bariatric patients. Methods: Descriptive analysis of a regional BSU transport system in our county was performed. Data were collected for incidents covering an area of 622 sq. miles with a population of over 620,000. Requests for EMS service exceed 53,000 annually and are handled via a single 9-1-1 center. The BSU transport system utilizes three specially equipped ambulances (bariatric stretchers, lifts, ramps, and winches) strategically located throughout the county. The BSU ambulances rendezvous with the on-scene EMS unit and assist with transport of the patient and crew to the hospital. Results: There were 121 requests for BSU transports during the 12 month period of review with 108 (89%) ending in transport to the hospital. The average weight of transported patients was 419 lbs. Of BSU requests, 66 (55%) were dispatched ALS, with less than half receiving an ALS intervention. The most common complaint type was Acute Extremity Pain (19%). Twenty Four patients (20%) used the service. Average transport time increased by 150% for patients transported via BSU (30 minutes) compared to our system average on-scene time (12 minutes). Patient and EMS resource requirements were high with the BSU system and there were no reported injuries to patients or EMS providers during the review period. Conclusions: A regional BSU transport system provides a cost effective, safe and dignified means of transport of bariatric patients during EMS response. While more than half of cases were dispatched ALS, the most common complaint was Extremity Pain. No providers used unconventional modes of transportation for transporting a patient to the hospital during this period; 20% of patients utilized the system. The average transport time significantly increased however no adverse events were reported.

174. Nationwide Quality E-Registry for Dispatcher-Assisted Cardiopulmonary Resuscitation (DACPR) of Out-of-Hospital Cardiac Arrest (OHC A) - The Design for Structured Measurement

Patrick Chow-In Ko, Mei-Fen Yang, Kah-Meng Chong, Hui-Chih Wang, Chien-Hsin Lu, Chih-Hao Lin, Yen-Bing Chen, Yen-Ho Yang, Ming-Shian Lee, Wen-Chih Chuang, Cheng-Cheng, Wen-Long Chen, National Taiwan University, College of Medicine, Department of Emergency Medicine Category of Submission: Operations, Quality, Safety Systems, Disaster

Background: Following the guidelines of dispatch-assisted CPR (DACPR) may enhance bystander bystander resuscitation. The Registry of quality measurement for DACPR has never been explored. We designed a nationwide quality registry for DACPR performance and innovated a structured format of measurement. Methods: A nationwide Google Forms based online e-registry system covering over twenty administrative regions and more than twenty millions population was designed and launched for DACPR performance and quality measurement at individual case level for non-traumatic OHC A patient. Audio records of individual and automated training for performance rating. Data system could be immediately retrieved as feedback to each corresponding administrative region. Recognition of cardiac arrest by call communication, CPR Instructions upon the recognized OHC A, and chest compression upon the recognized OHC A were the three major categorical performance indicators, and each operational time interval of call-to-recognition, call-to-instruction, and call-to-compression were evaluated. Each categorical performance indicator (Y-axis) was paired with the box and whisker plot (X-axis) as a set of quality index for diagrammatic comparison in our design. We used regression analysis for statistical analysis. Results: A total of 1774 DACPR cases were included. We evaluated 68 calls across 18 regions were centralized into the nationwide DACPR Quality Registry in 6 months (minimal 40 to maximal 1,625 calls/region/population). Regional recognition rate significantly varied from 10.0% to 88.1% (p < 0.01; averaged 60.4%, SD 21.2%). Instruction rate varied from 41.3% to 93.1% (p < 0.01; averaged 77.4%, SD 14.9%). Compression rate varied from 45.2% to 88.4% (p < 0.01; averaged 75.3%, SD 12.8%). Averaged regional call-to-recognition time, call-to-instruction time, and call-to-compression time were 58 (SD 21), 92 (SD 48), and 174 (SD 71) seconds. The designated diagrammatic comparisons may indicate the administrative regions of better performance located at the upward and leftward dimension, and the ones of unsatisfied performance located at the downward and rightward dimension (diagrams will be illustrated). Conclusions: We successfully innovated and launched a nationwide DACPR quality e-registry showing a wide variety of regional performance needing improvement. The designated diagram may easily indicate and compare the individual performance across the joint regions.

175. PILOT RANDOMIZED CONTROL TRIAL OF PELVIC BINDER COMPARED TO STANDARD CARE IN PREHOSPITAL PATIENTS WITH A SUSPECTED PELVIC FRACTURE

Jonathan Studnek, Allison Infinger, Meghan Wally, Sarah Pierrie, Malcolm Lieimoe, Joseph Hsu, Rachel Seymour, Mecklenburg EMS Agency Category of Submission: Trauma

Background: Pelvic ring fractures are associated with high morbidity and mortality, however, pelvic binder usage in prehospital care control has not been rigorously tested. The primary objective of this study was to determine the feasibility of conducting a randomized controlled trial comparing standard care (available pelvic binder to standard care in prehospital patients with a suspected pelvic fracture. Methods: This prospective study collected data from an EMS agency - which serves a population of nearly 1 million and transports approximately 114,000 patients per year - and a level 1 trauma center. Eligible patients were those ≥18 years with a high-energy mechanism of injury and prehospital suspicion of pelvic fracture. Exclusion criteria were low-energy mechanism of injury, penetrating pelvic injuries, pregnancy, and inability to obtain informed consent. Results: A sample size of 160 patients (80/80) per group was required to show a 20% difference in the primary outcome measure with 80% power and a 0.05 two-sided level of significance. Of 130 patients enrolled, 128 were randomized. Group allocation was 64/64 (64%). The time from call to arrival, time from dispatch to arrival, and time from triage to treatment were all significantly shorter in the binder group. Conclusions: A randomized controlled trial of prehospital pelvic binder use is feasible and will provide important new data about the benefits and risks of this technology.

176. DESCRIPTIVE ANALYSIS OF PATIENTS TRANSPORTED VIA GROUND AND AIR CRITICAL CARE TEAMS FOR FACIAL ORBITO-MAXILLARY MEMBRANE OXYGENATION (ECMO)

Matthew Stajnkrzyer, Ryan Sherdon, Meghen Lamp, Kathleen Berns, David Claypool, Mayo Clinic Category of Submission: Medical

Background: Despite improved portability and ease of cannulation, few U.S.-based medical transport services currently transport patients on ECMO. The purpose of this study was to perform a descriptive analysis of a cohort of patients transported via air or ground while on ECMO. Methods: Retrospective case series of patients transported by critical care transport provider to a tertiary care facility between January 1, 2014 and May 31, 2017. Patients were included if transported while on ECMO. Test and Fisher’s Exact Test were performed for statistical analyses. Results: Twenty-five patients met inclusion criteria, of which 16 (64%) were male. Mean age was 43.4 ± 17.6 years (range 1–86 years). Sixteen patients were transported on VA-ECMO, while 9 were transported on VV-ECMO. Three patients were transported by ground critical care team, while 9 were transported by rotor wing and 13 were transported via fixed wing. Mean transport time was 60.8 ± 28.4 minutes. The most common indications for ECMO were respiratory failure/acute lung injury (48%) and cardiogenic shock (28%). Four patients received ECMO as extracorporeal life support (ECLS) for refractory cardiac failure. Three patients receiving ECMO initiation or transport. Two patients required fluid boluses for low blood flow, while 5 received blood transfusion for cannulation-related blood loss. The most common complications in transit were sepsis, muscle relaxation, and heparinization. Survival to hospital discharge was 48%, with improved survival amongst younger patients (p < 0.52). Mortality for patients on VA-ECMO was 62.5%, compared
with 33.3% for those on VV-ECMO (p = 0.35). In patients receiving ECLS, 50% survived to discharge versus 30% for VT/VT arrests. No difference in survival was noted based upon early (40%) versus late (50%, p = 0.70) ECMO initiation. 

Conclusions: In our patient cohort, ECMO was associated with significant adverse event or mortality. VA ECMO for cardiopulmonary support was associated with worse final outcome. ECLS secondarily to VT/VT arrest did not appear to confer better survival to discharge compared with other dysrhythmias. The current data suggest that transportation of ECMO patients is safe, and future implementation of ECMO need not be delayed pending transfer.

177. Does Prehospital Mode of Arrival Influence Women’s Decisions to Participate in Research?

Madeline Karafanda, Martina Anto-Ocran, Vivian Lewis, Todd Jusko, Jeff Bazarian, Edwin van Wijngaarden, Courtney Jones, Department of Environmental Health Category of Submission: Medical

Background: Advances in medicine require voluntary participation in research. This requirement is often complicated further by the need to avoid compromising study generalizability, as it is often unclear how refusal’s may differ. Further complicating the matter is the National Institutes of Health (NIH) requirement, that proposed research studies address any possible disparities in the gender and race of the study participants. Inclusion/exclusion criteria have been described in the literature as a methodological approach to address these disparities. Few, however, have focused on how prehospital factors, specifically mode of arrival (ambulance vs non-ambulance) may influence prehospital participation in research. Our study aimed to determine how prehospital factors, specifically mode of arrival, influenced women’s decision to participate in research.

Methods: This study was a retrospective analysis of prehospital ST-Elevation Myocardial Infarction (STEMI) alerts. Hospital records were reviewed for ED physician interpretation of EKG findings of ST-elevation, LBBB, or neither (nondiagnostic). Primary outcomes were cath lab activation and intervention. Secondary outcomes analyzed were presence of initial elevated troponin. We included patients with missing records.

Results: A total of 107 STEMI Alerts were transported over the study period, with records available for 102 patients. Of patients identified as EMS STEMI Alerts, 45.1% went to cath, and 36.3% received coronary intervention. Rates of cath lab activation and coronary intervention were significantly higher in patients transported to the closest facility. Further work is needed to determine if this finding is unique to females or a larger population.

Conclusion: Women’s decisions to participate in research may be influenced by prehospital factors, specifically mode of arrival. Future research should explore if this finding is unique to females or a larger population.

178. Pediatric Bypass: Characteristics and Effects on EMS Resources

Jennifer Fishe, Kevin Pooter, Kyle Fratta, Carla Tilchin, Jennifer Anders, University of Florida College of Medicine - Jacksonville Category of Submission: Pediatric

Background: Regionalization of pediatric care decreases pediatric service availability at community hospitals. However, pediatric regionalization’s effects on EMS operations are unknown. This study describes pediatric transport characteristics, focusing on bypass patients. 

Methods: This retrospective study examined all transports ages 0–17 years from three geographically diverse EMS agencies (urban, suburban, and rural) over a 12-month period. Those agencies only pediatric destination protocol is the CDC Trauma Triage Tree. Primary outcome was refusal to transport to any facility other than the nearest. 

Results: The three agencies transported 12,223 pediatric patients during the study period, and 8,039 (66%) bypassed the nearest facility to a higher level of care. Bypass was defined as transport to a facility other than the nearest. 

Conclusion: Pediatric patients more likely to refuse transport to any facility other than the nearest. Future studies should explore the barriers and facilitators for research participation.

179. Removal of Left Bundle Branch Block from Prehospital ST-Elevation Criteria Decreases Number of Unnecessary Cath Lab Activations

Rachel Semmons, Elizabeth Mannion, Andrew Thompson, Quinn Fox, Jamie Wilson, Cory Thomas, Tampa Fire Rescue, University of South Florida Category of Submission: Cardiac

Background: Prehospital identification of STEMI allows decreased time to PCI. False positive prehospital EKG may waste resources through unnecessary cath lab activation as well as pose risks to patients. Our current prehospital STEMI Alert Criteria includes ST-elevation in two or more contiguous leads and/or presumed new left bundle branch block (LBBB) in the presence of anginal symptoms. LBBB was removed from STEMI criteria in the most recent AHA/ACC STEMI Guidelines as a result of lower specificity.

We hypothesized that LBBB has led to a high number of false positive activations in our system and can safely be removed from our STEMI criteria. 

Methods: We conducted a retrospective analysis of prehospital STEMI alerts. Hospital records were reviewed for ED physician interpretation of EKG findings of ST-elevation, LBBB, or neither (nondiagnostic). Primary outcomes were cath lab activation and intervention. Secondary outcomes analyzed were presence of initial elevated troponin. We included patients with missing records.

Results: A total of 107 STEMI Alerts were transported over the study period, with records available for 102 patients. Of patients identified as EMS STEMI Alerts, 45.1% went to cath, and 36.3% received coronary intervention. Rates of cath lab activation and coronary intervention were significantly higher in patients transported to the closest facility. Further work is needed to determine if this finding is unique to females or a larger population. 

Conclusion: In our population, removing LBBB from prehospital STEMI criteria decreases unnecessary cath lab activations. Future studies should explore if this finding is unique to females or a larger population.
Background: Paramedics often encounter patients who are frequent users of emergency services for non-emergent conditions. In some jurisdictions, these patients are treated by community paramedics or mobile integrated healthcare teams. After establishing a program of home visits by community paramedics for patients identified by paramedics as being at-risk patients, our study sought to identify patients who might benefit from this model of care prior to their becoming high users. In 2014, we integrated a semi-structured assessment tool into our electronic patient care report (ePCR) that allows front-line paramedics to flag patients they encounter as being at risk of harm or of becoming frequent users. This At Risk Referal (ARR) evaluates patients over a range of risk factors and forwards their information to a community paramedic for follow-up. The purpose of the present study is to describe the ARR and to examine the sensitivity of the tool for identifying at-risk patients over a 2.5-year period. Methods: All ePCRs that contained an ARR between January 1, 2014 and July 20, 2016 were identified by searching for the annual number of patient IDs (N = 169,810). Data extracted for the present study included: date, age, sex, and at-risk characteristics (lack of social supports, mobility issues, employment, communication impairment, safety concerns, and others). Results: On average, paramedics identified 422 patients/month or 1.4 incidents/day as being at-risk patients, representing 0.8% of total incidents over 2.5 years. Overall, 1,109 ARRs were completed for 943 patients, 19% of which had more than one incident over 2.5 years. Fifty-five percent of incidents involved female patients; and the average age was 68 years (range 13–99 years). Of the 1,109 incidents, the two most common reported at-risk categories were lack of social supports (71.9%) and safety concerns (70.3%), with 51% of incidents categorized by both of these risk factors. Conclusions: This study demonstrates that front-line paramedics regularly use an ARR to identify patients deemed at risk of harm or of becoming common callers. Incidents were generally characterized by more than one at-risk category. More studies are needed to understand outcomes among identified patients and screen for other patients not identified who become frequent callers.

Background: Trauma and Injury Severity Score (TRISS) has been used to predict mortality of trauma patients and to perform quality improvement of trauma care system. In advanced countries, functional outcome including disability is more emphasized as a quality indicator for trauma care system. The goal of this investigation is to develop modified model of Trauma Related Injury Severity Score to predict Disability (TRISS-D) for acute trauma patients. Methods: We used emergency medical services based severe trauma database of the Korea Centers for Disease Control. We enrolled 14,791 patients transported to the fire department from January to December 2013 in 10 provinces across Korea. We calculated revised trauma score (RTS) and injury severity score (ISS) of each patient. We developed modified TRISS model predicting severe disability and worsening disability using age index (0–14, 15–54, 55–85 years), RTS and ISS.
new patients assessed between January 1, 2016 and 31, 2017. Audio recordings were assessed by a pediatrician and in 131 (31.7%) patches no request was granted, implementing a medical directive with increased paramedic autonomy for pain control would be warranted.

188. QUANTIFYING EMS RESOURCE ALLOCATION FOR PEDIATRIC TRANSPORTS

Jennifer Anders, Jennifer Fishe, Kevin Psoter, Carla Tilchin, Kyle Fratta, Johns Hopkins University School of Medicine Category of Submission: Pediatric

Background: Regionalization of pediatric care decreases available pediatric services at community hospitals. Therefore, some children show little closer hospital to direct transport to pediatric specialty facilities. Future tools assisting EMS with transport destination choices must balance EMS resource allocation with direct transport’s benefits. To do so, the current burden of pediatric transport on EMS agencies must be quantified to provide a benchmark for future systems changes. Objective: The objective of this study was to develop a quality improvement program which will enhance the outcome of online medical control on a Canadiaan EMS system and use the study findings to develop a quality improvement program which will enhance the outcome of online medical control.

Methods: A retrospective review of written and audio records of online medical control interactions from April 1, 2016 to March 31, 2017. Audio recordings were assessed by a single reviewer to evaluate predetermined criteria which gauged the efficiency of communication that occurred during each interaction.

Results: There were 454 online interactions in the fiscal year, 14 cases were excluded as audio was unavailable or not retrievable due to technology failure at the dispatch level. Therefore 413 cases were assessed. Three hundred thirty-eight patches (81.8%) were managed in 4.42 ± 4.78 minutes but required fewer DSD (2.8 vs. 3.47). Conclusions: The management of RVF remains challenging. While the achievement of ROSC was higher in the non-DSD group, the difference did not meet statistical significance.

Those who received DSD earlier had higher rates of ROSC than those with more delay, and required fewer DSD attempts.

187. REGIONALIZATION OF PEDIATRIC CARE

Jennifer Anders, Jennifer Fishe, Kevin Psoter, Carla Tilchin, Kyle Fratta, Johns Hopkins University School of Medicine Category of Submission: Pediatric

Background: Regionalization of pediatric care decreases available pediatric services at community hospitals. Therefore, some children show little closer hospital to direct transport to pediatric specialty facilities. Future tools assisting EMS with transport destination choices must balance EMS resource allocation with direct transport’s benefits. To do so, the current burden of pediatric transport on EMS agencies must be quantified to provide a benchmark for future systems changes. Objective: The objective of this study was to develop a quality improvement program which will enhance the outcome of online medical control on a Canadiaan EMS system and use the study findings to develop a quality improvement program which will enhance the outcome of online medical control.

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Those who received DSD earlier had higher rates of ROSC than those with more delay, and required fewer DSD attempts.
Stratify Patients with Undifferentiated non traumatic chest pain. Further studies in the prehospital environment with a larger sample size are needed to determine if HRV can be used by EMS to rapidly risk stratify patients with undifferentiated non traumatic chest pain. 191. CORRELATION OF EEG-BASED BRAIN RESUSCITATION INDEX AND END TIDAL CO2 IN PORCINE CARDIAC ARREST MODEL

Dongsun Choi, Hee Jin Kim, Taehan Kim, Ki Jeong Hong, Young Sun Ro, Kyoung Jun Song, Hee Chan Kim, Shin Sang Do, Seoul National University Hospital, Department of Emergency Medicine Category of Submission: Cardiac

Background: Evaluation and monitoring of brain viability is important during resuscitation of cardiac arrest. We developed a non-invasive EEG-based brain resuscitation index (EBRI) and evaluated correlation EBRI and end tidal CO2 (ETCO2). Methods: A crossover animal experimental study using porcine cardiac arrest model was designed. After 1 minute of untreated ventricular fibrillation, alternation of high quality CPR (compression depth 5 cm and compression rate 100/min) and low quality CPR (compression depth 3 cm and compression rate 60/min) was performed for every 50 seconds in 10 phases. EBRI was calculated from selected single EEG channel which have the lowest noise. Mixed model analysis was conducted to compare the differences of hemodynamic parameters, ETCO2 and EBRI between high quality CPR period and low quality CPR period. Pearson’s correlation coefficient was calculated to assess correlation between EBRI and ETCO2. Results: Experiment was performed in five female porcine (44 ± 2.8 kg). EBRI and ETCO2 was obtained according to quality of CPR received. Delta EBRI obtained during high quality CPR was significantly higher than delta EBRI of lower quality CPR (HQC: Mdn = 0.04–0.30, LoQ: Median = –0.18–0.05–0.32, p < 0.01). EBRI had statistically moderate positive correlation with ETCO2. In porcine cardiac arrest model, EEG-based Brain Resuscitation Index was successfully obtained during resuscitation and had statistically moderate correlation with ETCO2.

192. SOCIAL CONNECTEDNESS AND COPING STYLES IN EMS WORKERS AND THEIR ASSOCIATION WITH BURNOUT AND PERCEIVED STRESS

Lori Boland, Pamela Mick, Jonathan Kamrud, Jessica Jeruzal, Russell Myers, Charles Lick, Andrew Stevens, Allina Health Emergency Medical Services Category of Submission: Professional

Background: Medical intervention patient care bundles have been advocated as a process based system to improve patient care and outcomes using evidence based guidelines. We sought to evaluate the performance of a Prehospital “Crashing Patient” Critical Care Bundle on the performance of key prehospital interventions for patients presenting with respiratory distress. Methods: This critical care bundle of care addressing key interventions for critically ill patients was implemented in an urban Advanced Life Support (ALS) EMS system from 2012–2014. Implementation of the care bundle, retrospective Patient Care Report (PCR) review was conducted of PCs with a chief complaint of “Respiratory Distress” for the first calendar quarter after implementation (July–September 2014) and compared to
PCRs for the most recent quarter (April–June 2017). Rates of EKG & end tidal carbon dioxide (etCO2) monitoring and CPAP ventilation were compared for all respiratory distress cases. For the subset of patients who received Albuterol for bronchospasm, the rates of albuterol for bronchospasm for Methylprednisolone Sulfate and 1:1000 Epinephrine were compared between the two time intervals. Results: There were 905 respiratory distress PCRs in the 2014 interval and 885 in 2017. In 2017 there were improvements in EKG monitoring from 32.6% to 45.9% (p < 0.0001) of cases, etCO2 monitoring from 7.1% to 17.3% (p < 0.0001), NIRS from 37.2 to 45% (p < 0.0009) & CPAP use from 6.5% to 10.8% (p = 0.0013). 408 of the patients received Albuterol for bronchospasm in 2014 compared to 306 in 2017. In this subset there were improvements in the administration of Methylprednisolone from 24.4% in 2014 to 52% (p < 0.0001), Magnesium Sulfate from 12.5% to 19.9% (p = 0.0091) & 1:1000 Epinephrine from 3.2% to 6.8% (p = 0.0318). These care improvements were associated with a decrease of the rate of cardiac arrest after EMS contact for medical patients in the 2017 interval. Conclusions: The implementation of a prehospital critical (“crashing”) patient bundle of care resulted in a significant performance improvements in accordance to some invencions for respiratory distress patients. Patient care bundles may have significant utility to improve patient care and safety in the prehospital setting.

194. TRACKING VIOLATIONS OF NEWLY IMPLEMENTED BEHAVIORAL EMERGENCY TREATMENT PROTOCOL

Timothy Lynch, Christie Fritz, David Schoenfeld, Beth Israel Deaconess Medical Center, Boston, MA

Background: In September 2014, Massachusetts statewide EMS protocols authorized the use of haloperidol and/or a benzodiazepine for management of behavioral emergencies. The newly adopted protocol allows for medication administration with contraindications of age <18, history of seizures, or prolonged QT interval. Geriatric dosing was reduced by 50%. The new protocol is being reviewed as a quality improvement training module. The purpose of this investigation is to describe the frequency and type of protocol violations observed during the implementation phase, and determine the goal of helping to better understand the types of errors, so as to improve implementation of future treatment protocols. This will help to determine what further training if any is needed and plan for future protocol roll out difficulties. Methods: Retrospective chart review of calls occurring between October 1, 2014 and June 30, 2015, in which the new behavioral emergencies protocol was utilized. Cases were reviewed for protocol violations and the type and rate of violation was recorded. Results: There were a total of 56 calls during the study period that utilized the new behavioral emergencies protocol including the administration of haloperidol. Protocol deviations were identified in 29% (95%CI 18–42%) of cases. The most common error was protocol violations at 17%(95%CI 9–26%), with 13% (95%CI 6–24%) having a seizure history of concern. Next was 9% (95%CI 4–20%) of pediatric administrations. 9%(95%CI 4–20%) of haloperidol administrations were not reduced for geriatric use. While not required by the protocol, haloperidol was requested in 14% (95%CI 7–27%). Conclusions: Standard Treatment Protocols allow for rapid implementation of care by prehospital providers, without the need to contact OLMC. Little is known about the type and frequency of errors observed when adopting a new protocol and this analysis can provide useful insight to help better tailor training for new protocol implementation. There were no necessary calls to OLMC were observed, suggesting a lack of familiarity or confidence with the new protocol. This investigation demonstrates potential risks in new protocol implementation and we recommend further study to develop best practices for training and implementation of new clinical protocols.

195. EMERGENCY PHYSICIAN TELEHEALTH DISPOSITIONS OF LOW-ACUITY 9-1-1 PATIENTS

Michael Gonzalez, David Penrose, Guy Gleisberg, Karen DuPont, Andrew Kincannon, Houston Fire Department, Category of Submission: Military

Background: Every day within the United States low-acuity patients are transported to emergency departments (ED) for primary care. American College of Emergency Physicians and National Association of EMS Physicians believe not all patients require ALS care and in these circumstances, alternate transport and destination may be appropriate. EMS patient disposition protocols are traditionally determined by the medical assessment along with off-line medical direction. At present, literature regarding prehospital physician telehealth patient dispositions are limited. Objective of this study was to measure and report prehospital emergency Telehealth and Navigation (ETHAN) mobile-integrated patient dispositions for alternate transportation and destination. Methods: This retrospective study was conducted on consecutive EMS patients triaged by telehealth emergency physicians in a major metropoli- tan urban fire-based EMS system from December 2014 through May 2017. Once on scene, EMS completes a patient assessment together with the Physician, and contacts the Physician, who interprets the patient via real-time video/voice conferencing and determines the appropriate disposition. Those cases where the ETHAN protocol was employed were abstracted from the ePCR system. Descriptive statistics describe study characteristics and a 95% confidence interval was calculated for all dispositions. Results: During the study period 10,042 patients met the ETHAN criteria. Among this group of telehealth dispositions, alternate transport and destination was employed 1440 times (14.3%). 594/2/00 (27%) were referred to OLMC. 353 (16.5%) were referred to MED, 274 (15.2%) were referred to the ED, and 89 (4.9%) were referred to other hospital services. 6% (64/1000) of patients declined and 218 (10.8%) were not referred to any hospital service. Conclusions: An online survey was conducted with ten Canadian Paramedic Services with a 40.5% response rate (n = 717). Factor analysis was used to identify variation in responses related to the latent factor of transactional stress. The scale was validated using both exploratory and confirmatory factor analysis. Results: The sample of transactional stress questions was split to allow for multiple analyses (EFA n = 360 / CFA n = 557). In the exploratory factor analysis, principal axis factoring with an oblique rotation resulted in a factor, twelve item solution, (KMO = .832, x² = 1440.19, df = 66, p < .001). Confirmatory factor analysis also endorsed a two factor, 12 item solution, (x² = 130.1–133.3, CFI = .95, TLI = .93, RMSEA = .07, SRMR = .06). Results supported two groups of six-item factors that captured transactional stress in the provision of service which were significantly aligned with transactional stress issues internal to the ambulance and transactional stress relationships external to the ambulance. Both sub-scales demonstrated good test-retest reliability (α = .843/α = .768) and were correlated (p < .01) with a convergent validity measure. Conclusions: This study successfully validated a two-factor scale which captures stress associated with the day to day provision of EMS and the interaction with allied professions. The development of this measure of transactional stresses further expands the potential that paramedics, Paramedic Services, employers, and prehospi- tal physicians may understand the dynamics that influence provider stress. As a result, there may be greater opportunities to intervene holistically to improve paramedic health and well-being.

197. REVIEW OF EMERGENCY MEDICAL SERVICES (EMS) TRANSPORTS TO A FREESTANDING EMERGENCY DEPARTMENT (FSED)

Matthew Chinn, Brittney Farrell, M. Riccardo Colella, Medical College of Wisconsin Category of Submission: Operations, Quality, Safety Systems, Disaster

Background: Freestanding emergency depart- ments (FSED) are an area of expansion in healthcare. Despite rapid growth, there is a minimal amount of literature regarding the appro- priate triage of patients to these facilities by emergency medical services (EMS) providers. Purpose: The study seeks to review and develop a list of objective markers for improving EMS field triage to a FSED through evidence-based recommendations. Methods: Patient data was retrospectively reviewed from the EPIC electronic medical record system of all patients brought in to a single FSED over a six month period during a six month convenience period. A report was generated to abstract patient demographic, medical information, and disposition. Missing data fields were then abstracted. Ambulance services were all previously given a list of FSED capabilities and guidance on bypass for major trauma, STEM, and stroke.
Jennifer Farah, J. Joelle Donofrio, Nicholas Protocols and Their Corresponding Level Agencies' Pediatric Respiratory Distress Variability of California Local EMS triage patients to the most appropriate emergency evaluative other possible indicators that may be used to be a limitation. Further research is needed to evaluate other possible indicators that may be used to triage patients to the most appropriate emergency department.

198. VARIABILITY OF CALIFORNIA LOCAL EMS AGENCIES' PEDIATRIC RESPIRATORY DISTRESS PROTOCOLS AND THEIR CORRESPONDING LEVEL OF EVIDENCE Jennifer Farah, J. Joelle Donofrio, Nicholas Aldridge, University of California, San Diego CATEGORY OF SUBMISSION: STUDENT, RESIDENT, FELLOW Background: We sought to compare California local EMS agencies' (LEMSA) protocols and review evidence-based guidelines on the treatment of three main pediatric respiratory complaints by presentation: asthma (wheezing), bronchiolitis (wheezing <24 months), and croup (stridor). Methods: In 2016, publicly available protocols from 33 California LEMSAs were itemized and reviewed in the following categories: wheezing, wheezing <24 months, and croup. Descriptive statistics were used to compare these protocols. Literature reviews, including the American Academy of Pediatrics (AAP) and the American Academy of Pediatrics (AAP) guidelines were used to create level of evidence (LOE) tables for asthma, bronchiolitis, and croup. Of note, steroids were included only in the literature review, while California protocols do not currently use steroids prehospital. The evidence-based tables were compared to California local EMS agency protocols. Results: Among the 33 LEMSAs, wheezing protocols had the least amount of variability with only two of the six treatments, ipratropium (15/33) and nebulized epinephrine (9/33), having >2 LEMSAs with variability. The most common wheezing treatments included albuterol (33/33) and IV/IM epinephrine (33/33). The least common treatments included nebulized epinephrine and magnesium (2/33). Current evidence strongly supports the use of albuterol, ipratropium, epinephrine, magnesium, steroids, and noninvasive positive ventilation (NIPPV) in the treatment of asthma. Only one agency (C) administered nebulized wheezing in children <1 year of age, referencing this as possible bronchiolitis. The other two agencies (A, B) did not include nebulized hypertonic saline, nebulized epinephrine, steroids or suctioning. For children <6 months, albuterol and steroids no longer strongly recommended based on new AAP guidelines. Stridor had the highest protocol variability, with no treatment having uniform use among agencies. The most common treatment was nebulized epinephrine (24/33), NIPPV (29/33), and humidified mist (18/33). The least common treatments were nebulized epinephrine (12/33) and suctioning (4/33). Current evidence supports the efficacy of all formulations of epinephrine. Conclusions: There is wide variation among California LEMSAs in their management of pediatric respiratory distress. Recent changes to treatment guidelines have likely created the discordance between current treatment practices and LOE tables. Timely evidence-based updates will likely benefit prehospital agencies' treatment protocols.

199. EARLY IMPACT OF AN EMERGING MI PROGRAM FOR 9-1-1 HIGH UTILIZERS Jon Ehrenfeld, Ashley Clayton, Catherine Counts, Michael Sayre, Seattle Fire Department CATEGORY OF SUBMISSION: OPERATIONS, QUALITY, SAFETY SYSTEMS, DISASTER Background: Vulnerable, medically complex patients comprise a disproportionate share of emergency medical services (EMS) system E-EMS patients: A social worker-based Mobile Integrated Healthcare (MIH) program was designed to intervene using either direct engagement (DE) or community care engagement (CC). We hypothesized that sustained outreach would reduce 9-1-1 activations and engage more appropriate services. Methods: We used computer-aided dispatch and electronic health records to identify housed individuals with ≥3 EMS responses in the previous quarter. The social worker then assigned enrollees to the DE or CC cohort based on previous call volume, current services, vulnerability, and history of engagement. Case management activities for DE and CC included, ongoing 9-1-1 utilization, and reason for disenrollment when applicable. Groups were compared by chi-squared and t-tests. Results: During the baseline quarter, EMS responded 389 times to 45 patients. Twenty-eight were female, the median age was 64 (IQR 56–71), 29 were Caucasian, and 12 were African American. Median medical and social complexity, with a mean of 4–5 medical or social comorbidities per patient. Nineteen were assigned to DE and 26 to CC. In the baseline quarter, DE had a significantly lower number of responses (DE 9.5 ± 7.2, CC 13.4 ± 4.7, p = 0.054). More patients in the DE cohort received multidisciplinary case conferences (57% vs. 8%, p = 0.002) and primary case linkage (55% vs. 15%, p = 0.008), while case management staffing alone was more prevalent in the CC cohort (77% vs. 47%, p = 0.041). Quarterly EMS responses declined to 5 ± 3.7 after 3 months, 6 ± 4.5 after 6 months, and 3.9 ± 4.5 after 9 months of enrollment. Clients in the third quarter averaged a six call decrease compared to baseline (15–10.2, p = 0.031). Nine were disenrolled due to death, relocation, or reduction in EMS calls. Conclusions: These preliminary findings indicate that MIH direct engagement and case coordination yield a reduction in 9-1-1 utilization. This study was limited by a small sample size and lack of randomization, but strongly indicates that additional investigation is warranted.

200. URBAN LAW ENFORCEMENT NALOXONE DEPLOYMENT FOR TREATMENT OF SUSPECTED OUT-OF-HOSPITAL OPIOID OVERDOSES: A PILOT PROGRAM Eric Cortez, David Keseg, James Davis, Ken- neth Kuebler, Ashish Panchal, Ohio Health Doc- tors Hospital CATEGORY OF SUBMISSION: OPERATIONS, QUALITY, SAFETY SYSTEMS, DISASTER Background: Law enforcement (LE) nalox- one programs aimed at early recognition and treatment of opioid overdose are widely established. Implementation is often challenged by emergency medical services (EMS) engagement, which may impact adoption and overall success. The objective of this pilot program was to evaluate the implementation of a naloxone pilot program at a large urban LE agency supported by local EMS providers. We hypothesized that with direct training and support from EMS providers, LE adoption would be high. Meth- ods: This prospective pilot program was conducted between May 2016 and December 2016. LE officers, investigative personnel, and support personnel underwent training by the city’s fire-based EMS providers. LE training included identifying the symptoms of opioid overdose, and administration of naloxone if opioid overdose was suspected and respiratory depression was present. LE personnel were deployed with 2 mg naloxone doses administered intranasally at a mucosal atomizer device. At the end of the study period, LE personnel completed a survey concerning their training and experience with naloxone administration. LE clinical performance was evaluated based on LE and EMS one administration. Outcomes included patient survival at the time of EMS arrival, and the results of the post program survey. Results: A total of 124 LE officers trained with 31 (25%) LE officers administering naloxone to 58 suspected overdose patients. Thirty-two (26%) administered naloxone to more than one patient. Seventy-six (61%) of the patients received a single 2 mg dose of naloxone, and 2 (3%) of the patients received two 2 mg doses of naloxone. Of the treated patients, 98% (57/58) patients survived to EMS arrival. The post program survey demonstrated that 82% of LE offi- cers felt they received adequate naloxone training, 90% felt that the program was efficiently and safely used of naloxone, and 90% felt prepared to handle issues on scene. Conclusions: This study suggests that urban LE agencies partnered with EMS may successfully imple- ment naloxone administration programs for suspected opioid overdoses. Limitations to this study include the lack of patient-centered outcomes, and the significant number of LE officers that did not administer naloxone.

201. ASSOCIATION OF CASE VOLUME PER AMBULANCE STATION WITH OUTCOME OF OUT-OF-HOSPITAL CARDIAC ARREST (OHCA) Tae Han Kim, Sang Do Shin, Kyong Jun Song, Ki Jeong Hong, Young Sun Ro, So Yeon Koon, Seoul National University Hospital, Department of Emergency Medicine CATEGORY OF SUBMISSION: OPERATIONS, QUALITY, SAFETY SYSTEMS, DISASTER Background: Sufficient case volume for emer- gency medical service may be important for retention of resuscitation skills and procedures during prehospital management of Out- of-Hospital Cardiac Arrest (OHCA). We eval- uated association of case volume per ambulance station with outcome of OHCA. Methods: Nationwide data of all adult OHCA dur- ing 2013-2014 was obtained from a national registry. All ambulance stations were stratified in 4 groups according to annual average number of OHCA treated by EMS teams dispatched from each ambulance station. A logistic regression model was conducted to evaluate effect of increased case volume per an ambulance station to in-hospital survival of OHCA. Results: From 2013 to 2014, total of 47,637 OHCA were treated and transported by EMS teams from 1,205 ambulance stations nationwide. Mean annual number of OHCA dispatched from each ambulance station was 19.8 cases. Overall survival to discharge rate
was 5.5% with 2.9% of discharge with favor-
able neurological outcome. Survival was high-
est in group 4 (largest case volume) vs. 3.3% in group 1 (smallest case volume). Adjusted odds ratio of largest case volume per ambulance station for pre-
hospital EMS dispatching strategy accord-
ingly, the study sample including proportions and confidence intervals. Results: There were 205 patients transported by EMS to a community hospital where they were then transferred to the Level I trauma center. Thirty had confirmed abnormalities on head CT (14.6%). The mean age was 78 years (range: 55–91), 57% female, and the most frequent mechanism of injury was falls (93%). Median length of stay at the trauma center was 13.5 days (range: 0–80). CT findings included subdural hematoma (60%), subarachnoid hemorrhage (50%), and intraparenchymal hemorrhage (36.7%). Five patients required neurosurgical intervention (17%) and 17 required ICU admission (27%), two were discharged from the ED (7%), and two transitioned to inpatient hospice (7%). Conclusions: In our sample, geriatric patients with TBI who were subsequently transferred to a trauma center were overwhelmingly injured via falls and had variable resource utilization and clinical outcomes. Additional ways for resource utilization and identifying older adults who are at high risk for TBI are warranted.

203. RELATIONSHIPS BETWEEN RIGHT ATRIAL AND AORTIC PRESSURES AND JUGULAR AND CAROTID FLOWS RESPECTIVELY IN A SWINE MODEL OF ASYMPHILIC PSEUDELECTRIC ACTIVITY

Norman Paradis, Karen Moodie, Sarah Crock-
ett, Jeffrey Gould, Christopher Kaufman, Dartmouth-Hitchcock Medical Center

CATEGORY OF SUBMISSION: CARDIAC

Background: The initial cardiac rhythms found during in-hospital respiratory arrests are typi-
cally either pulseless electrical activity (PEA) or asystole. Pseudo-PEA (p-PEA) often precedes true PEA and is characterized by a low flow state in which cardiac contraction produces a non-palpable blood pressure. The purpose of the study was to characterize the relationships between venous and arterial pressures and the flows that drive brain perfusion in a hypoxic asphyxial model of p-PEA. Hypoth-
esis: We hypothesized that during CPR right atrial pressure (RAP) would be related to jugu-
lar venous flow (JVF), and that aortic pressure (AOP) would be related to carotid flow, and that these relationships might change with time dur-
ing p-PEA. Methods: Pseudo-PEA was induced via hypoxia asphyxiation in 12 domestic swine (~32 kg) with standard physiological monitor-
ing: AOP and RAP were measured with solid state transducers placed in the thoracic aorta and right atrium. Blood flow was measured in the common carotid artery and jugular vein with ultrasonic flow probes. FiO2 was reduced to 6% by increasing the fraction of nitrogen up to 60% to target systolic blood pressure (SBP) of 40 mmHg was used to define p-PEA. The relationship between pressures and flows was determined with a Pearson correlation coefficient. Results: Overall, RAP was significantly negatively corre-
related with JVF (r = −0.51, p < 0.05), however, the relationship varied over time during p-PEA (Figure 1). AOP was significantly positively corre-
related with carotid flow (r = 0.85, p < 0.05), but did not show the same time dependence as seen with RAP and JVF. Conclusions: In an asphyx-
ial model of out-of-hospital cardiac arrest, pressures and flows were negatively associated and the relationship varied as a function of time. Arte-
rial pressures and flow were positively associ-
ated and the relationship varied less over time. These findings have implications for how and when chest compressions or other interventions should be applied when treating p-PEA.

205. PREHOSPITAL PUSHDose Epinephrine in HYpotension

Mark Merlin, Navin Ariyaprakai, Annmendeep Tagore, Matthew Harris, Andrew Parrish, Josh Schwarzbaum, Alex Torres, Michael Carr, Susmith Koneru, Newark Beth Israel Medical Center/RWBarubas-MONOC

CATEGORY OF SUBMISSION: MEDICAL

Background: Hypotension is commonly encountered in the prehospital arena and occurs in the setting of illness, trauma or may be iatrogenic during rapid sequence intubation (RSI). The mainstay of prehospital treatment has been intravenous (IV) fluids; however, this method is not always effective. Push doses of epinephrine or phenylephrine, so called “push-dose puffers,” have long been used by anesthesiologists for acute hypotension in the operating room. Push dose epinephrine (PDE) offers another tool to advanced life support (ALS) providers to combat hypotension. Meth-
ods: A retrospective review of data collected for the administration of PDE for the management of acute hypotension in the prehospital setting. We included patients >17 years old with systolic blood pressures <90 mmHg during the peri intubation period. Primary outcome was cardiac arrest. Secondary outcomes included changes in vital signs and improvement in the intubation and control group. Results: PDE was administered 75 times in the two-year study period. 22 of those were peri-intubation (treatment group). Mean age in PDE was 69 years vs. 72.4 years in control group (P = 0.23). When comparing pre- and post-intubation vital signs of patients receiving PDE, we found significant increases in mean HR, SBP, DBP, MAP, and SI (P < 0.001). In the control group SBP, DBP, MAP, SI, and RR all achieved a statistical significant decrease of the mean (P < 0.001). The mean dose of epinephrine was 10 micrograms (range 10–80mcg); 19.7% of peri-intubation patients in the control group went into cardiac arrest. Only 4.5% of patients in the treatment group went into cardiac arrest. This did not reach statistical significance. Conclusions: PDE used in the management of peri-intubation hypotension in the prehospital setting resulted in statistically significant increases in SBP, DBP, MAP and SI. The control group showed statistically significant worsening of vital signs after intubation. Overall, fewer patients went into peri-intubation cardiac arrest after adminis-
tering PDE. Readily available, easily composed and rapidly effective, PDE is a useful tool to combat acute hypotension in the prehospital arena.
206. **Accuracy of Stroke Dispatch by a Large Urban EMS Dispatch System**

Thomas Lardaro, Dustin Holland, Tom Arkins, Dan O’Donnell, *Indiana University School of Medicine*

**Category of Submission:** Medical

**Background:** Stroke is a time sensitive emergency that requires appropriate triage in EMS transport planning. The existence of hospitals with varying stroke-care capabilities and more recently mobile stroke units (MSUs) necessitates early recognition of stroke symptoms and accurate triage of patients to appropriate resources. This study investigates the accuracy of the EMS dispatch system in a major U.S. metropolitan area in predicting whether or not a patient is having a stroke.

**Objective:** The objective of this study was to evaluate the accuracy of stroke recognition by a large urban EMS dispatch system in the United States.

**Methods:** We performed a retrospective cohort study looking at the initial dispatch for stroke within a large urban-area EMS system. We then compared these patients to a stroke registry from a large urban tertiary hospital in the same city over a two-year period (2015–2016).

**Results:** Over the study period, a total of 33,910 patients were transported to the tertiary care hospital for any complaint, including 778 patients with an initial dispatch code for stroke. Of the patients with initial dispatch coded as stroke, 133 were then confirmed as truly having a stroke based on stroke registry data. Dispatch for stroke had a sensitivity of 43.2% (95% CI 37.6–48.9), specificity of 98.1% (95% CI 97.9–98.2), positive predictive value of 17.1% (95% CI 15.1–19.3), and negative predictive value of 99.5% (95% CI 99.4–99.5).

**Conclusions:** These findings imply EMS dispatch alone is not sufficient to rule-in stroke. In the case of MSUs, dispatch alone may lead to patients being inappropriately triaged to this resource due to the 82.9% false positive rate. The authors conclude that (1) triage tools beyond dispatch are required to ensure appropriate triage of potential stroke patients for intercept by a MSU or transport to a stroke center and (2) EMS systems need triage tools to prevent inappropriate triage of non-stroke patients to such resources such as MSUs to ensure patient safety and to prevent delays in definitive care.