Abstracts for the 2018 NAEMSP Scientific Assembly

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ABSTRACTS FOR THE 2018 NAEMSP SCIENTIFIC ASSEMBLY

Oral Presentation Abstracts (1–30)

1. TIMING OF ADVANCED AIRWAY PLACEMENT AFTER OUT-OF-HOSPITAL CARDIAC ARREST: EARLIER IS BETTER

Justin Benoit, Jason McMullan, Henry Wang, Changchun Xie, Peixin Xu, Kimberly Hart, Christopher Associates, University of Cincinnati

Category of Submission: Cardiac

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 including age, sex, bystander interventions, and EMS response time. Patients were right censored at time of hospital arrival or EMS termination of resuscitation. Results: A total of 7,547 OHCA patients were evaluated. Mean age was 67 years (standard deviation 15), 69% were male, 38% had an initial shockable rhythm, and 49% received bystander CPR. Median EMS response time was 6 minutes (interquartile range 4–7). Time from EMS arrival to advanced airway placement was 0–5 minutes (12%), 5–10 (36%), 10–15 (29%), 15–20 (14%), 20–25 (5%), 25–30 (2%), and >30 (2%). Median time from EMS arrival to ROSC was 19 minutes (interquartile range 14–25). Time to advanced airway placement was significantly associated with ROSC based on the Cox model. If initial shockable rhythms, the probability of ROSC was 59%, 35%, 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. Conclusions: 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.

2. EMS AGENCIES WITH HIGH RATES OF FIELD TERMINATION OF CARDIAC ARREST CARE ALSO HAVE HIGH RATES OF SURVIVAL

John Summers, Christopher Berry, Anne Knorr, Mark Olaf, Douglas Kupas, Geisinger Health System

Category of Submission: Cardiac

Background: The relationship between field termination of resuscitation (FTOR) and survival from cardiac arrest is unknown. We hypothesized that EMS agencies with more frequent FTOR would be more likely to optimize resuscitative efforts on scene and would also have better patient outcomes. Methods: The Cardiac Arrest Registry to Enhance Survival (CARES) identified out-of-hospital cardiac arrests (OOHCAs) occurring from 2013 to 2016. A priori, EMS agencies were included if they submitted at least 80 cases during this period. Subsequently, agencies were divided into quartiles based upon FTOR frequency. The top and bottom quartiles were identified as high (HFTAs) and low field termination agencies (LFTAs). Generalized estimating equation models were used to compare HFTAs and LFTAs. Results: Seventy agencies were classified as HFTAs (treating 31,486 OOHCAs patients) and 70 agencies were classified as LFTAs (treating 27,314 OOHCAs patients). FTOR was performed on 51.6% HFTA patients and on 71.7% LFTA patients. The mean patient age was 62.1 years and 61.2% were male. HFTAs were more likely to have patients with a shockable rhythm (OR = 1.16, 95%CI 1.1–1.3, p = .003) and who received bystander CPR (OR = 1.52, 95%CI 1.3–1.7, p < .001) than LFTAs. HFTAs had higher proportions of ROSC (35.4% vs. 26.4%, OR = 1.38, 95%CI 1.2–1.6), survival to discharge (12.5% vs. 8.5% OR = 1.46, 95%CI 1.3–1.7), and favorable neurologic outcome in survivors (86.7% vs. 77.9%, OR = 1.84, 95%CI 1.4–2.4) than LFTAs, all p < .001. These results remained significant after controlling for patient characteristics like age, shockable rhythm, and bystander CPR. When compared to LFTAs, HFTAs spent greater time at the scene before patient transport (25 min vs. 16 min, 95%CI 6.3–9.0 p < .001) and were more likely to administer drugs to patients (92.0% vs. 86.7%, 95%CI 1.0–2.1, p = .04). Conclusions: EMS agencies with the highest rates of FTOR also have higher rates of ROSC, survival, and good neurologic outcome. HFTAs spend more time on scene before patient transport, suggesting they may not have a culture of “scoop and sloop” for OHCA care. Additional studies are needed to identify any subgroup of OHCA that may benefit by transport for care at a hospital.

3. PREHOSPITAL DELIVERY OF DEATH NOTIFICATIONS ASSOCIATED WITH HIGHER RATES OF OCCUPATIONAL BURNOUT AMONG EMS PROFESSIONALS

Remle Crowe, Rebecca Cash, Madison Rivard, Abraham Campos, Brian Clemency, Robert Swor, Eric Ernest, Ashish Panchal, The National Registry of Emergency Medical Technicians

Category of Submission: Operations, Quality, Safety, Systems, Disaster

Background: EMS professionals often undergo the difficult task of notifying families when a death occurs in the prehospital setting. However, many do not receive related training, which may exacerbate the associated stress. The emotional strain that accompanies death notifications has been linked to burnout in other healthcare settings, yet this has not been examined in EMS. Our objective was to assess the relationship between death notification, training and work-related burnout among EMS professionals. We hypothesized that after controlling for training, delivering death notifications would be associated with higher odds of burnout. Methods: We analyzed data from a cross-sectional electronic survey administered in April 2017. A sample size calculation approximated that 1,300 responses were needed to make estimates with 95% confidence. Assuming an 11% response rate from previous work, we randomly selected 19,330 nationally-certified EMS professionals. Inclusion criteria consisted of EMS or higher, practicing in non-military settings. We assessed burnout using the validated Copenhagen Burnout Inventory and providers self-reported training and the number of adult death notifications delivered in the past 12 months. We conducted multivariable logistic regression modelling using confounders selected a priori from previous research: certification level, experience, agency type, and call volume. We used the Hosmer-Lemeshow goodness-of-fit test to assess model calibration. Results: We received 2,333/19,330 responses (response rate:12.1%) and 1,514 (65%) met inclusion criteria. Over half (55%, n = 780) delivered at least one death notification in the past 12 months, while one-third (32%, n = 468) exhibited burnout. A step-wise increase in burnout prevalence was noted as number of death notifications increased. The prevalence of burnout was 23%, 36%, and 51% for those who delivered 0, 1–5, and 6 or more death notifications, respectively. After adjustment, delivering one or more death notifications was associated with 47% greater odds of burnout (OR:1.47, 95%CI 1.12–1.94). Meanwhile, training was associated with reduced odds of burnout (OR:0.60, 95%CI 0.47–0.77). Conclusions: After adjustment for...
Background: Along with out-of-hospital cardiac arrest (OHCA), opioid abuse and overdose (OD) have become major public health problems due to an increase in opioid-related deaths that have increased in the US, recent temporal and regional trends in the proportion of OHCA related to OD-OHCA are largely unknown and may impact treatment strategies and outcomes. Objective: To assess trends in incivility in EMS and work, and outcomes of OD-OHCA compared to presumed cardiac etiology arrests (C-OHCA). Methods: Statewide observational study utilizing an Utstein-style database, along with detailed review of EMS first care reports linked with hospital records and vital statistics data between 2010 and 2015. The proportion and 95% Confidence Intervals were calculated to compare the rate of arrests between OD-OHCA vs. C-OHCA. Multivariate logistic regression was carried out to compare survival between the two groups. Results: There were a total of 21,018 reported OHCA during the study period. After excluding non-C-OHCA/ non-OD-OHCA, 18,988 cases remained. Overall, 18,001 (98.4%) of births were C-OHCA and 987 (5.2%) were OD-OHCA. There was a significant increase in the proportion of OD-OHCA between 2010, 4.89% (3.5-6.5%), and 2015, 6.4% (95% CI = 5.7-7.3). Mean age for OD-OHCA was 38.8 yrs compared to 62.4 yrs for C-OHCA (p < 0.0001) and location of OD-OHCA arrests was more likely residential 66.6% vs. 54.0% (p < 0.0001). Shockable rhythm was present in 7.0% of OD-OHCA vs. 22.6% of C-OHCA (p < 0.0001). bystander CPR was performed in 49.4% of OD-OHCA vs. 83.8% of C-OHCA (p < 0.5231). Overall survival to discharge in the OHCA group was 18.6% vs. 11.9% in the C-OHCA group (p < 0.0001). After risk adjustment, there was an aOR of 2.0 (1.6-2.5) for survival to hospital discharge in the OD-OHCA group compared to the C-OHCA group. Conclusions: This statewide study found a significant upward trend in the proportion of OD-OHCA 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-OHCA exist and emergency medical systems should track OD-OHCA to optimize their prevention and resuscitation efforts.

6. DEATH BY SUICIDE: The EMS Profession Compared to the General Public

Bentley Bobrow, Micah Panczyk, Robyn Blust, Paula Brazil, Taylor George, Vatsal Chikani, Chengcheng Hu, Daniel Spaithe, Arizona Department of Health Services Category of Submission: Operatives, Quality, Safety, Systems, Disaster

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, such as law enforcement, presumably related to multiple chronic stressors. While anecdotal EMS suicide case reports and national survey data on suicidal ideation/ attempts have received much attention, there is a dearth of data on EMS suicide completions. We sought to determine the statewide proportionate mortality ratios of suicide completions among EMS compared to the general public (GP) in Arizona. Methods: Observational study of adults (>18 yrs; 1/2009- 12/2015). The Arizona Vital Statistics Information Management System-Electronic Death Registry was queried with manual review of decedent occupation free-text fields. These data were compared to the non-EMS cohort aggregate of all other occupations combined. Suicide was defined based on ICD-10 E-Codes. The proportionate mortality ratios (PMRs) for suicide were compared between the groups, after adjusting for age, sex, race, and mortality. Results: There were a total of 349,793 GP deaths (all causes) of which 7,775 (2.2%) were by suicide. EMT death total was 1,295 EMT-63 (5.2%) by suicide. Demographics of suicide: Mean age: GP-48.7 yrs; EMT - 43.4 yrs (p = 0.023); Male GP-73%; EMT-88%; White non-Hispanic: GP-80.0%; EMT-73.0% (p = 0.166). The crude odds ratio (OR) for EMT suicide was 2.43 (95% CI = 1.88-3.13) compared to the GP. The adjusted OR (aOR) for EMT suicide was 1.39 (95%CI) = 1.06-1.82) compared to the GP. The top three mechanisms of suicide among EMTs and the GP in Arizona, respectively, were firearm (67% vs. 57%), suffocation (24% vs. 21%), and poisoning (9.5% vs. 17%). Conclusions: In this statewide analysis, EMTs in Arizona had a significantly higher proportion mortality ratio of deaths due to suicide compared to the general population controlling for age, sex, race, and ethnicity. This is the first study that we are aware of to compare an EMT suicide completion with the general public. Hopefully this information will increase awareness and spur studies to elucidate underlying causes and evaluate the effectiveness of interventions.

7. ASSESSMENT OF THE RAPID ARTERIAL occlusion Evaluation (RACE) Scale in a Real-World Practice for Prediction of Large Vessel Occlusion and Reducing Time to Thrombectomy

Peter Antevy, Brijesh Mehta, Ashutosh Jadav, Joe Spence, Scott Schumacher, Vatsal Chikani, Andy Lima, Gina Dimartini, Lakota Woodall, Ryan McTaggart, Romil Chandra, Thabele Leslie-Mazvi, Joshua Hirsch, Albert Yoo, Tudor Jovin, Raul 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 population 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 neurointerventional 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 (53%). Higher hospital RACE scores correlated with NIHSS scores. LVO was found in 13% of patients with an available RACE score. 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 68 patients (26%) were found to have LVO while 29 patients (11%) had ICH; among 499 patients with RACE score less than 5, LVO was present in 38 patients (8%). When an EMS stroke alert score triggered early alert of the neurointerventional team, median door to groin puncture time for thrombectomy was 68 minutes compared to 91 minutes for cases with no workflow. Conclusions: The RACE scale can be
successfully implemented across EMS agencies and results in faster door to groin puncture times. While a RACE score of 5 or higher is associated with a greater likelihood of LVO, there are a significant number of false positives. Further refinement of prehospital stroke severity scales is warranted to improve the accuracy of this approach.

8. EFFECTING NEUROLOGICALLY-INTACT SURVIVAL IN CHILDREN WITH OUT-OF-HOSPITAL CARDIAC ARREST

Paul Pepe, Paul Banerjee, Aminder Singh, Latha Ganti, University of Texas Southwestern Medical Center CATEGORY OF SUBMISSION: PEDIATRIC

Background: EMS crews commonly limit on-scene care for pediatric out-of-hospital cardiac arrest (POHCA) patients, typically attempting to provide treatment while transporting. Physical, Neurologically-intact survival for children can be improved by deferring transport and prioritizing on-site care using strategies that expedite on-scene drug delivery and intubation with tightly-controlled ventilation. Methods: Data for all consecutive POHCA cases in January 1, 2012 and April 30, 2017 were collected prospectively (comprehensive Utstein-style registry). In 2014, new training prioritized on-scene triage strategies (Phase I) that expedited drug delivery and intubation with controlled ventilation (e.g., rates ~6/min). In 2016, techniques to dose/prepare drugs while responding were introduced (Phase II). Neuro-intact survival in 2012–13 (Phase 0, pre-changes) were then compared to Phase I and II outcomes. Throughout the study, protocols followed the 2010 American Heart Association guidelines. No other relevant modifications were made system-wide. The modified training included psychological and skills-enhancing tools to provide greater confidence in providing on-scene care. Results: EMS crews managed 143 consecutive POHCA cases over the 5.33-year study period throughout which the majority of children continued to present in asystole, including those resuscitated. In resuscitated patients, the interval from vehicle arrival on-scene to the first epinephrine administration fell from 16.5 minutes (2012–2013) to 7.3 minutes (Phase I) and 5.0 minutes (Phase II). Children received appropriate on-scene and intravenous intubation in much greater frequency on-scene in Phase I and II with no other significant differences in terms of age, sex, etiology, response intervals, or sequence of drug infusions. Rates of survival to hospital discharge with intact neurologic status did improve immediately: 23.2% (13/56) in Phase I and 34.7% (17/49) in Phase II versus 0 of 38 for the pre-change calendar years of 2012-2013 (p = 0.0001, 2-tailed Fisher’s exact test). By 2017, the mean time to epinephrine administration had fallen to 2 minutes for resuscitated patients and 3.33 minutes for all patients. Conclusions: Although a historically-controlled study, the sudden appearance of neuro-intact survivors following the renewed focus on on-scene care was profound, immediate and sustained. Beyond skills-enhancing strategies, physiologically-driven techniques and supportive encouragement from leadership, pre-arrival psychological and clinical tools were also likely contributors to the observed outcomes.

9. MOTIVATIONS FOR EXITING THE EMS PROFESSION DIFFER BETWEEN EMTS AND PARAMEDICS

Madison Rivard, Remie Crowe, Rebecca Cash, Jeremy Miller, Ashish Panchal, The National Registry of Emergency Medical Technicians

Category of Submission: Operations; Quality, Safety, Systems, Disaster

Background: Understanding motivations for exiting the workforce is important to improve recruitment and retention of EMS professionals. Factors influencing the choice to leave EMS have not been explored by provider level. Our objective was to describe and compare the most important reasons 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 practicing in EMS. Inclusion criteria consisted of those who reported not working in EMS; Z-tests of proportion with a Bonferroni adjustment for multiple comparisons were used to evaluate differences in reasons for exiting between EMTs and paramedics. Results: We received 4,193/51,344 responses (response rate = 10%) and 2,793 met inclusion criteria. Most were EMTs (85%, n = 2,291) and 1% 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%). There was more than 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 32% of paramedics (p < 0.001). Conclusions: Important factors related to leaving EMS differed by provider level. Of concern, a larger proportion of paramedics reported illness/injury/disability or stress/burnout 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 (FTDS) physiologic step is a moderate predictor of pediatric trauma center (TC) need. Predictive ability could be hindered by the current use of adult values 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 of age with serious injury, transported by EMS to pediatric TC was conducted in three mid-sized cities. EMS providers were interviewed to obtain patient demographics and presence or absence of each FTDS criteria. Children were considered to need a TC if they met a published consensus definition. Outcome data was obtained through structured hospital record review. The over- and under-triage rates and positive likelihood ratios (+LR) were calculated using traditional and age-specific cut points for the physiologic criteria as well as for systolic blood pressure (SBP), and respiratory rate (RR). Results: EMS and outcome data were available for 4,944 children. 2% of all patients needed the resources of a TC. 11% of patients met the physiologic step when traditional 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 2.67, 95% CI 2.21–3.22). The traditional RR cut point had a +LR of 3.12 (95% CI 2.39–4.07). The age-specific RR cut point had a +LR of 1.86 (95% CI 1.50–2.22). 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 3.84–10.00). EMS providers were 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.

11. COMPARATIVE EFFECTIVENESS OF ANTIARRHYTHMIC FOR OUT-OF-HOSPITAL CARDIAC ARREST: A SYSTEMATIC REVIEW AND NETWORK META-ANALYSIS

Shelley McLeod, Romina Brignardello-Petersen, Andrew Worster, John You, Alla Lansavichene, Gordon Guyatt, Sheldon Cheskes, Schwartz/Reisman Emergency Medicine Institute, University of Toronto CATEGORY OF SUBMISSION: CARDIAC

Background: The objective of this systematic review, direct pairwise meta-analysis and network meta-analysis (NMA) was to assess the use of antiarrhythmic drugs for patients experiencing out-of-hospital cardiac arrest (OHCA). Methods: Electronic searches of Medline, EMBASE, and Cochrane Central Register of Controlled Trials were conducted and reference lists were hand-searched. Randomized controlled trials were prioritized over non-randomized trials investigating the use of antiarrhythmic agents administered during resuscitation for adult (≥18 years) patients suffering non-traumatic OHCA were included. Two reviewers independently screened abstracts, assessed risk of bias of the included studies, and extracted data for the following outcomes: return of spontaneous circulation (ROSC), survival to hospital admission, survival to hospital discharge and survival to hospital discharge with good neurologic status. Direct and indirect evidence were combined in a NMA using a frequentist approach with Johnson’s GRADE approach. Results: 8 RCTs involving 4,464 patients were combined to compare the effectiveness of five antiarrhythmic agents (amiodarone, bretylium, lidocaine, magnesium, and sotalol) and placebo administered during resuscitation following cardiac arrest. Amiodarone was associated with a statistically significant increase in ROSC compared to placebo (1.15; 95% CI: 1.03–1.28) and compared to bretylium (1.61; 95% CI: 1.00–2.60) for ROSC.
When compared to placebo, both amiodarone (1.18; 95% CI: 1.08–1.30) and lidocaine (1.18; 95% CI: 1.07–1.30) were associated with a statistically significant increase in survival to hospital admission (certainty of the evidence was high). However, no antiarrhythmic was statistically more effective than placebo for survival to hospital discharge or neurologically intact survival, and no antiarrhythmic was certain to have any other favorable outcome (certainty of the evidence was low or very low). Conclusions: Amiodarone and lidocaine were the only agents associated with improved survival to hospital admission in the NMA. For the outcomes most important to patients, survival to hospital discharge and neurological intact survival, no antiarrhythmic was convincingly superior to any other or to placebo.

12. EMERGENCY MEDICAL SERVICES PROVIDER PERSPECTIVES ON PEDIATRIC CALLS: A QUALITATIVE STUDY

Jessica Jerzul, Lori Boland, Monica Frazer, Jarad Leck, Andrew Stevens, Allina Health Emergency Medical Services Category of Submission: CARDIAC

Background: Previous survey results in our area indicate that 9-11 responses to incidents involving children are particularly distressing for emergency medical services (EMS) clinicians. This qualitative study was conducted to increase understanding about the difficulties of responding to pediatric calls and obtain information about how organizations can better support EMS providers in managing potentially difficult calls. Methods: Paramedics and emergency medical technicians from a single U.S. ambulance service were invited to participate in focus groups about responding to 9-11 calls involving pediatric patients. A total of 17 providers from two rural and metro service regions participated in six focus groups held in community meeting spaces. A semistructured focus group guide was used to explore: (1) elements that make pediatric calls difficult, (2) pre-arrival preparation practices, (3) experiences with potentially difficult pediatric calls, and (4) perspectives about follow-up resources and support. Focus groups were audio recorded and transcribed. Data were analyzed using NVivo qualitative data analysis software. Results: Responses about elements that make pediatric calls difficult, pre-arrival preparation practices, experiences with potentially difficult pediatric calls, and perspectives about follow-up resources and support were collected. Focus groups were audio recorded and transcribed. Data were analyzed using NVivo qualitative data analysis software.

13. EFFECTIVENESS OF PREHOSPITAL HYPTERTONIC SALINE FOR HYPOTONIC PATIENTS: A SYSTEMATIC REVIEW AND META-ANALYSIS

Ian Blanchard, Armghan Ahmad, Karen Tang, Paul Ronksley, Diane Lorenzetti, Gerald Lazarenko, 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 than that of the human body, may increase circulating volume and mute the pro-inflammatory response of the body to injury and illness. The purpose of this study was to determine whether in patients presenting with hypotension in the prehospital setting (population), the administration of hypertonic saline (intervention), compared to an isotonic fluid (control), improves survival to hospital discharge (outcome). Methods: In this PROSPERO registered systematic review, searches were conducted in Medline, Embase, CINAHL, and CENTRAL from the date of database inception to November, 2019. Two review authors independently selected randomized control trials of hypertensive human participants administered hypertonic saline in the prehospital setting. Hypertonic saline was defined as an isotonic fluid, which included normal saline, and near isotonic fluids such as Ringer’s Lactate. Assessment of study quality was done using the Cochrane Collaboration’s 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, adverse events, 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 500 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 (n = 1,162 injured patients) with minimal statistical heterogeneity (I2 = 0%). The pooled relative risk of survival to hospital discharge with hypertonic saline was 1.02 times that of patients receiving near isotonic fluids (95% CI: 0.95,1.10). There were no consistent statistically significant differences in secondary outcomes. Conclusions: There was no significant difference in important clinical outcomes for hypertensive injured patients administered hypertonic saline compared to isotonic fluid in the prehospital setting. Hypertonic saline can not 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, Ashish Panchal, Jose Cabanas, Wake Forest University Category of Submission: PROFESSIONAL

Background: Violence against Emergency Medical Services (EMS) providers is increasing. Little is known regarding providers’ response during threatening situations. Recognition and management of threatening situations is key to provider and patient safety. Our objective was to determine a relation between provider characteristics and response to escalating threats of violence during EMS calls. We hypothesized that providers with greater EMS experience and training would be more likely to escape threatening situations.

Methods: EMS providers of a large county-based system participated in specially-developed patient care simulations. Each scenario simulated threats of violence so that providers should escape the scene for safety. Trained evaluators recorded performance per provider on standardized data elements including time, de-escalation attempts, and escape. Our primary outcome was whether the provider escaped before the scenario ended. Our secondary outcome was whether a provider made 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 <3% missing data. Overall, 55% (n = 145/263) made an adequate de-escalation attempt and 55% (n = 147/266) 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 = 0.35), and gender 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) (2.13, 1.19-3.89, p = 0.02). As experience increased, a stepwise decrease in the proportion of providers that escaped was noted (p-trend = 0.01). Providers with 20-plus years of EMS experience had 64% lower odds of escaping (0.38, 0.18–0.84, p = 0.02) compared to CIT (0.37, 0.20–0.74, p = 0.02) or CIT (0.37, 0.20–0.74, p = 0.02) who had reduced odds of escaping. Conclusions: Nearly half of EMS providers failed to escape a simulated scene with threat of physical violence. Experienced 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, Marus Robinson, Christian Martin-Gill, Francis Guyette, Department of Emergency Medicine, 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 (CSC). The Rapid Arterial Occlusion Evaluation (RACE) scale can identify patients with LVO and facilitate triage to CSCs, with published sensitivity of 66% and specificity of 84% at a score of ≥5. We aimed to demonstrate the implementation feasibility and performance of prehospital rMACE scale, which does not assume the laterality of aphasia and agnosia symptoms, to identify LVO. Methods: The rMACE scale was implemented in 12 EMS agencies, scoring out aphasia and agnosia regardless of laterality of symptoms to improve the ease of training and capture of atypical symptoms. Testing consisted of a didactic presentation with both video and hands-on demonstrations of patient scenarios. A step-by-step scoring guided paramedics through the evaluation method were collected prospectively and documented.
upon completion of the prehospital electronic health record. A project coordinator obtained in-hospital data elements 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 790 patients with suspected stroke. Complete in-hospital data were available for 517 (66%). Of these, 186 had a mRACE scale of 3.5. There were 188 (36%, CI 32–40%) cases with final diagnosis of ischemic stroke of which 65 (12.6% CI 10–16%) had LVO. This yielded 75.3% (CI 72–79%) specificity, 68.6% (CI 65–73%) sensitivity, and 45.6–77% PPV, and 83.8% (CI 75–90%) NPV with a ROC AUC of 0.76 in the identification of LVO. Conclusions: Implementing the prehospital mRACE scale to identify patients with LVO is feasible and performs similarly to the RACE scale without need for detailed measurement of laterality of symptoms. Further research is necessary to determine if implementation of the mRACE scale leads to increased interventions for patients with LVO and subsequent decreased morbidity.

16. EFFECTS OF FAILED DEBRIDEMENT AT BIOLOGY CHARACTERISTICS OF THE VENTRICULAR FIBRILLATION ELECTROCARDIOGRAM

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Category of Submission: STUDENT, RESIDENT, FELLOWS

Background: The morphology of the electrocardiogram (ECG) of the ventricular fibrillation (VF) waveform during cardiac arrest can be quantified using signal analysis (QECG). Studies have shown that QECG measures may be predictive of defibrillation success. We sought to quantify the effect of failed rescue shocks on the QECG values for patients with VF in out-of-hospital cardiac arrest (OHCA). We considered a failed shock to be one in which the ECG rhythms did not change to and after the shock. We hypothesized that failed rescue shocks would lead to worsened QECG measures. Methods: Electrocardiogram data were taken from non-traumatic, EMS-treated OHCA cases from the Resuscitation Outcomes Consortium (ROC) Continuous Chest Compression trial. For each shock, we analyzed the shock delivery area (AMSA), median slope (MS), centroid frequency (CF), and detrended fluctuation analysis (DFA) were calculated for the closest artifact-free 3 second gap in chest compressions prior to and after the shock. We used custom-built MATLAB programs to perform QECG calculations. QECG 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 QECG values. Results: Out of 5,195 total shocks, 1,399 shocks were included in the study. For the first shock. For all shocks, AMSA increased from 4.83 to 5.60 (p-value < 0.001). 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. We found no correlation appeared between time to post QECG measurement and the change in QECG values. Conclusions: For all the QECG measures except for DFA, a slight improvement in value 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 QECG; (2) The pre-shock values remained low which may make decreases difficult to detect from a floor effect; and (3) Modern bi-phasis 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 Hagedorn, Ian Phelps, Darren Sandbeck, Damon Scales, Eddy Lang, Christopher Doig, Alberta Health Services/University of Calgary Category of Submission: PREDOMINANTLY CANADIAN

Background: Out of key conditions such as cardiac arrest and trauma, little is known about the epidemiology of mortality of all transported EMS patients. The purpose of this study was to describe characteristics of EMS patients who after transport, die in a health care facility. Methods: EMS transport events over one year from a BLS/ALS system serving an urban/rural population of approximately 2 million were linked with in- hospital datasets, ED and in-patient mortality, and in-patient mortality. Medical Priority Dispatch System (MPDS) determinants of transport: age (> 18 years, adult, <17 years - pediatric), gender, day of week, season, time (categorized in six hour periods), and the highest mortality MPDS cards, paramedic clinical impressions, and ED diagnoses (International Classification of Disease v10.2). are presented. Results: A total of 239,534 EMS events resulted in 159,507 patient transports: 141,114 were included for analysis after duplicate removal (89.1% linkage). Of 141,114 patients, 4,269 died (3.0%; 95%CI 2.9%, 3.1%). There were 724/4,269 deaths in the ED (17.0%) and 3,545/4,269 died as in-patients (83.0%). The proportion of overall mortality by MPDS determinant was Echo (24.6%), Delta (3.9%), Charlie (3.4%), Bravo (1.1%), Alpha (2.1%), and Omega (1.1%). For adults the mean age of survivors was less than non-survivors (52 vs. 75 years, p < 0.001), but pediatric survivors were older than non-survivors (8.8 vs. 2.8, p < 0.001). Males had increased mortality (3.3%) compared to females (2.9%) (p < 0.001). Mortality did not change by day of week (p = 0.57), but did by season with increased ED mortality in the winter. The highest overall mortality occurred with patients presenting between 0600–1200 hours (9.2%), and the lowest between 1800–2400 hours (2.3%) (p < 0.001). The MPDS cards with the highest overall mortality were 9-cardiac/respiratory arrest (34.4%), 33-interfacility transfers (7.1%), 6-breathing problems (5.8%), and 28-stroke/transient ischemic attack (4.3%). The highest overall mortality for paramedic clinical impressions were cardiac arrest (76.4%), respiratory arrest (18.0%), hypovolemic/shock (11.4%), and stroke/CAV (10.9%). The ED diagnoses with the highest overall mortality were related to neoplasms (19.8%), circulatory system (12.4%), respiratory system (7.4%), and infections (6.0%). Conclusions: Significant in-hospital mortality differences were found between event, patient, and clinical characteristics. These data provide important foundational and hypothesis generating knowledge regarding mortality in transported EMS patients that can be used to guide research and training.

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

Daniel Lane, Ian Blanchard, Gerald Lazarenko, Christopher Oleynick, 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, FELLOWS

Background: Sepsis is a life-threatening syndrome caused by a dysregulated immune response to infection. Early recognition and intervention are critical to improve patient outcomes. In modern systems, paramedics often encounter patients with sepsis before other clinicians, offering an important opportunity for earlier sepsis recognition and treatment. The purpose of this study was to estimate the incidence and examine characteristics of patients with infections, and sepsis transported by paramedics. Methods: A one-year cohort of all adults (> = 18 years) transported by a BLS/ALS EMS system servicing 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), tachynea (> 19 minutes), and fever (> 37.5°C), and operational factors such as prehospital time (minutes), transport distance from municipality to hospital, and highest Medical Priority Dispatch System (MPDS) determinant (Echo/Delta) 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 (89% linkage rate). The one-year incidence of infections, and sepsis were 11% and 2%, respectively. A minority of all patients with infections presented with fever (18%), abnormal GCS (22%) or tachynea (32%). Compared to other patients, adults with sepsis were more likely to have an abnormal GCS (60% vs. 16%, p < 0.001), tachynea (48% vs. 20%, p < 0.001), or fever (25% vs. 4%, 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 (26% vs. 31%, p < 0.001). Sepsis patients had longerprehospital intervals (mean 44 vs.39 minutes, p < 0.001) despite shorter transport distances (15/9.3 vs. 19.9 km/miles, p = 0.04). The in-hospital mortality rate for patients with infection was 6.8% (95%CI, 6.4–7.2), and 19% for sep sis (95%CI, 18–21). Comparing patients with infection and sepsis are common among paramedic- transported patients, and paramedics spend a considerable time with these patients prior to arriving in the ED. 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 treatment.

19. COMBINED PREHOSPITAL HYPOXIA-HYPOXTENSION “DEPTH-DURATION DOSE” AND MORTALITY IN MAJOR TRAUMATIC BRAIN INJURY

Daniel Spalte, Chengcheng Hu, Bentley Bower, Min-Jae Yoo, Chukkukh Chan, Joshua Gaither, P. David Adelson, Kurt Denninghoff, Amber Rice, Chad Viscusi, Duane Sherrill, Samuel Keim, University of Arizona Category of Submission: PREDOMINANTLY CANADIAN

Background: Our previous work has shown that the depth-duration doses of prehospital hypoxia (SpO2 < 90%) and hypotension (SBP < 90 mmHg), separately, were strongly associated with mortality in Traumatic Brain Injury (TBI). However, hypoxia and hypotension are...
obviously not mutually exclusive. Hence, the next logical step in evaluating the influence of the “dose” of these physiological anomalies is to identify the combined risk.

**Methods**: We evaluated major TBI cases (moderate/severe) enrolled in the EPIC Study (November 2001–March 2004) for inclusion. A total of 14,711 patients were identified, of which 4,701 were enrolled in the EPIC Study. Mean age was 44 years, 26% were male, and 28% were female. Mean systolic blood pressure (SBP) was 106 (SD 17.2) mmHg, and mean heart rate was 90 (SD 22) bpm. A total of 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 toxemia. Future patients were sequentially selected, and no study was considered an alternative of traditional transport. Additional prospective studies need to be performed to strengthen knowledge around adverse events. An antibiotic was ordered in 2016 as a rapid way to identify adult patients with suspected rebound toxemia who are likely to have poor outcomes. A 2017 study showed that qSOFA was correlated with hospital admission, ICU admission, hospital length of stay, and inpatient mortality. However, to our knowledge, the ability of the qSOFA score to predict patient outcome has not been fully evaluated in the prehospital setting. We hypothesize that prehospital qSOFA scores are correlated with up-triage (change to a higher acuity triage zone in the emergency department), presence of sepsis, ICU admission, and inhospital mortality.

**Background**: The quick Sequential [Sepsis-related] Organ Failure Assessment (qSOFA) score was proposed in 2016 as a rapid way to identify adult patients with suspected rebound toxemia. We retrospectively reviewed charts from consecutive patients undergoing transport between January 2001 and June 2016 by STAT MedEvac, a multistate provider of interhospital transport between January 2001 and June 2016. SBP < 90 mmHg (SBP < 90 mmHg) was included with up-triage (change to a higher acuity triage zone in the emergency department), presence of sepsis, ICU admission, and inhospital mortality. We conducted a systematic review and data extraction process. Discrepancies were resolved via discussion. A modified QUIPS tool was used to evaluate risk of bias. Analysis for prevalence of outcomes was performed. A total of 1,401 records were screened, and 518 full-text studies were reviewed with eight selected studies. This study found no incidence of adverse events from their sample of 71 released patients. 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 toxemia. Future patients were sequentially selected, and no study was considered an alternative of traditional transport. Additional prospective studies need to be performed to strengthen knowledge around adverse events.

**Conclusions**: Mortality or serious adverse events in the included studies due to suspected rebound toxemia 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 prehospital practice is not associated with adverse events.
retrospective observational study using prehospital ambulance vital signs to calculate qSOFA scores for all adult medical patients that presented in September 2016 to a large urban emergency department in Fresno, CA. Information from the electronic health record (EHR) was used to determine up-triage, presence of sepsis, hospital admission, ICU admission, and in-hospital mortality. Results: A total of 1903 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 (9.93% vs. 2.22%; p < 0.001), admission diagnosis of sepsis (19.2% vs. 3.08%; p < 0.001), and in-hospital mortality (6.2% vs. 0.74%; p < 0.001). A positive prehospital qSOFA score was not associated with up-triage (5.82% vs. 5.52%; p = 0.93); 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 is correlated with the diagnosis of infection and sepsis. Furthermore, it is correlated with poorer patient outcomes including mortalit

ICU 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 Leirmao, Daniel Osternauer, Brian Miller, Diza Akbar, Thomas Graveney, Stephanie Schroter, E. Brooke Lerner, Manish Shah, Bay College of Medicine, Pediatrics, Section of Emergency Medicine Category of Submission: Pediatric

Background: Seizures have the potential to cause significant morbidity and mortality, and are a common reason EMS are requested for a call. A pediatric prehospital seizure care evidence-based guideline (EBG) was published and has been implemented as protocol 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 enablers to adhering 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. Interviews were conducted using NVivo software, the grounded theory approach, and constant comparison to independently analyze recorded interviews until thematic saturation was reached. Results: Several overarching themes emerged from the 32 paramedics that were interviewed. Enablers included dosing/protocol references, training, provider knowledge about preferred routes, predefined provider roles, options to use different routes, online medical control, multiple crews on scene, and physical accessibility of medication on scene. System barriers included equipoipment availability, controlled substance management, infrequent training, few pediatric calls, unclear definition of a treatable seizure, and incorrect or incomplete reference tool for medication on scene. Personal barriers included fear of respiratory depression, confusion about dosing, and miscommunication about preferred route. Seizure management, and accurate methods of weight estimation. Paramedics shared treatment preferences for intubation vs. intramuscular medication, how transport distance affects management, use of online medical control, and the need to manage bystanders. Providers suggested system improvements 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 pediatric prehospital seizure outcomes.

25. ANALYSIS OF DOSING ERRORS MADE BY PARAMEDICS DURING SIMULATED PEDIATRIC PATIENT SCENARIOS AFTER IMPLEMENTATION OF STATE-WIDE PEDIATRIC DRUG DOSING REFERENCE

John Hoyle, Glenn Ekblad, Tracy Hoyer, 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 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 solution, and dosing reference (PDR), with doses listed in milliliters, the requirement that doses be drawn into a smaller syringe from a pre-loaded solution. 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 PDR. Methods: 8 EMS agencies completed 2 validated, pediatric scenarios: infant seizing and child seizing. Agencies were private, public, not for profit, for profit, urban, rural, fire-based, and third service. Simulations took place in a training center or mobile simulation unit. EMS crews used their regular equipment with sham drugs and were required to carry out all the steps to administer a drug dose. Two evaluators scored crew performance via direct observation and video review. A dose error was defined as σ = 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 EMTP/EMTP. 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%) benzodiacepine doses were incorrect (no dosing errors); 2/9 (22%; 95% CI 0%, 49.4%) drug dilutions were incorrect resulting in large dosing errors. In 1/10 cases (10%; 28.6%) the crew was unable to dilute DS to DS2. Unrecognized air bubbles were frequently encountered in the administration syringe resulting in underdoses. In 11/20 cases (55% 0.05), D0 was added to the drug. Unequal proportions of ALS and BLS (51% versus 49%, p < 0.001). Equal proportions of ALS and BLS (51% versus 49%, p < 0.001). Over one-third (34%) of those without training had performed an adult death notification, compared to 6% of those with training. Conclusions: 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 49%, p < 0.001) did not receive any death notification training. A larger proportion of BLS respondents did not receive any death notification training. The majority of respondents had received training. Training was not uniformly included in initial EMS education, and the proportion of providers prepared for this task is unknown. Our objective was to describe the experiences of death notification. Reporting of death notification was associated with greater comfort and cost. Methods: An electronic questionnaire was sent to a random sample of 20,000 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 notification in delivering death notifications was assessed using a 4-point scale. Inclusion criteria were practicing, non-military EMS or higher. Certifica
tion level was grouped into advanced life support (ALS) or basic life support (BLS). 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 49%, p < 0.001) did not receive any death notification training. A larger proportion of BLS respondents did not receive any death notification training. A larger proportion of BLS respondents did not receive any death notification training. Conclusions: Most respondents delivered a death notification in the past year; however, one-third of these EMS providers had not received training. Training was associated with greater comfort and prepa
rations. Limitations included recall bias attributed to self-report. Future work should focus on 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 demon
dored EMS providers’ decisions which patients have a cervical spine injuries and patients arriving at the emergency department.
department via EMS without a cervical collar rarely have serious cervical spine injuries. In a recent study, we demonstrated that implementation of a spinal motion restriction (SMR) protocol was associated with decreased cervical collar use. We sought to determine if this decrease was maintained with an increased number of serious cervical injuries among patients transported without cervical collars.

Methods: This was a retrospective analysis of 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 all calls during a 6-month period before (January–June 2015) and a 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 injury present in patients who died as a result of traumatic injuries. Results: There were 1,614 patient records identified, 819 under the immobilization protocol and 796 under the SMR protocol. Cervical collar use decreased from 66.8% to 59.3% (p = 0.002). There was no significant difference between time periods in the median age, sex, or the proportion of patients, average age or subtype of motor vehicle accident. No significant change was observed in the rate of CT cervical spine imaging (51.6% before and 52.5% after, p = 0.55). Serious cervical spine injuries were identified in 2.2% before and 2.4% of imaged 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 134.6% before and 18.7% after SMR (p = 0.01). 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, Thomas Fred Severyn, Ashish Panchal, The National Registry of Emergency Medical Technicians Category of Study: PSYCHOLOGICAL ASSESSMENTS, QUALITY, SAFETY, SYSTEMS, DISASTER

Background: Measuring and improving organizational safety culture has been linked to positive safety outcomes in EMS, yet few evaluation tools exist for this unique setting. The Agency for Healthcare Research and Quality’s (AHRQ) Surveys on Patient Safety Culture (SOPS) are widely used to assess safety culture in various healthcare settings and results are included in a national comparative database to allow for benchmarking; however, there is no SOPS instrument specific for EMS. Our objective was to evaluate the psychometric properties of an EMS-adapted tool based on existing SOPS domains. We hypothesized the reliability and validity of the EMS tool would be similar to existing SOPS instruments. Methods: The developed and psychometrically tested 37-item instrument adapting 10 domains from the SOPS instruments and one new domain capturing the unique EMS aspect of communication was administered to a call. We administered an electronic survey to all 332,584 nationally-certified EMS professionals. Analysis included computing item statistics for the 37-item instrument, conducting principal factors analysis using the 31–206 Abstracts

31. APPROPRIATE NEEDLE LENGTH FOR EMERGENT PEDIATRIC NEEDLE THORACOSTOMY UTILIZING COMPUTED TOMOGRAPHY

Maria Mandt, Kathleen Adelgais, Kari Hayes, Fred Severn, Children’s Hospital Colorado Category of Submission: Pediatric

Background: Needle thoracostomy is a life-saving procedure. Advanced Trauma Life Support guidelines recommend insertion of a 5 cm, 14-gauge needle for pneumothorax...
decompression. High-risk complications can arise if utilizing an inappropriate needle size. No study exists evaluating appropriate needle length for children measuring Broselow pediatric board-certified radiologist, obtained standard 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 at the anterior axillary line (ICS-AAL). Our outcomes included the median chest wall thickness 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 Gray/Pink (<66 cm): Median chest wall thickness at the right ICS-MCL of 1.5 cm (IQR 1.3 cm, 1.9 cm), left ICS-MCL 1.6 cm (IQR 1.5 cm, 2 cm), right ICS-AAL 1.7 cm (IQR 1.5 cm, 1.9 cm), left ICS-AAL 1.4 cm (IQR 1.4 cm, 2.2 cm). Children measuring Broselow Red/Blue (<66 cm): right ICS-MCL 1.8 cm (IQR 1.5 cm, 2.5 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 1.6 cm (IQR 1.3 cm, 2 cm). Children measuring Broselow Blue/Orange (<115 cm): right ICS-MCL 2.1 cm (IQR 1.7 cm, 2.5 cm), left ICS-MCL 2.1 cm (IQR 1.7 cm, 2.5 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 < 13 years of age. The standard 5-cm needle is twice the chest wall thickness of most children.

32. DESCRIPTIVE ANALYSIS OF DEFIBRILLATION VECTORS FOR USE IN REFRACTORY VENTRICULAR FIBRILLATION

Matthew Davis, Andrew Schapper, Jay Looslie, Kristine VanAaren, Shelley McLeod, Sheldon Cheskes, Department of Medicine, Division of Emergency Medicine, Western University

Background: Patients in ventricular fibrillation (VF) who do not respond to standard Advanced Cardiac Life Support treatments are deemed to have refractory VF (rVF). The ideal prehospital treatment for patients with rVF remains unknown. Double sequential external defibrillation (DSD) has been proposed as a viable option for patients in rVF. Although the mechanism by which DSD terminates rVF remains unknown, one theory is that the change in defibrillation vector that occurs may contribute. Our objective was to describe clinical outcomes for patients presenting in rVF during out-of-hospital cardiac arrest (OHCA). Methods: This was a retrospective chart review of adult (≥18 years) patients presenting in rVF during OHCA over 15 years beginning in March 2016. Patients who underwent vector change defibrillation had a change in pad position (anterior-anterior to anterior-posterior) after 3 or more consecutive shocks. Termination of rVF was defined as the absence of VF after a vector change or standard defibrillation during the next rhythm analysis. Results: There were 372 OHCA, with 25 (6.7%) presenting in rVF. Of these, 16 (64.0%) patients (median age 62 years, 83.1% male) had vector change after a median (IQR) of 3 (1.5–4) attempts. Median (IQR) time to vector change defibrillation was 8.7 (7.1–11.1) minutes. Eight (50%) patients had termination of rVF after the first vector change shock, 6 (37.5%) had hypothermia return of spontaneous circulation (ROSC) and 3 (31.3%) patients survived to hospital discharge. Of the 9 rVF patients who did not have vector change, median age was 63 years and 85.9% were male. The median (IQR) number of defibrillations within this group was 5 (4.5–7.0). All patients remained in VF after the fourth defibrillation. Prehospital ROSC was achieved in 3 (33.3%) patients. Three patients (33.3%) survived to hospital discharge. Conclusions: This is preliminary evidence that vector change defibrillation in patients with rVF may result in VF termination. A randomized controlled trial is warranted to test whether or not vector change has a role in the termination of rVF.

33. BENCHMARKING EMS COMPASS STROKE PERFORMANCE MEASURES USING A LARGE NATIONAL DATABASE

Jeffrey Jarvis, Dustin Barton, Lauren Sager, Nick Nudell, Williamson County EMS

Background: Prehospital stroke alerts have been proposed as a vector changing rapid ED treatment of acute strokes. These alerts are dependent upon the performance of validated stroke screening tools and assessment of blood glucose to eliminate a common stroke mimic. EMS Compass has identified several performance measures on this topic. No work has been done to calculate a national performance benchmark for these measures. These benchmarks would be useful in system improvement efforts. We aimed to develop a national performance benchmark on these measures for the first time.

Methods: Using anonymous data from consenting agencies using commercial EMS electronic health record (ESO Solutions), we identified records of patients felt to have acute strokes who were transported from the scene of a 9-1-1 call. From these records, we calculated the proportion of all patients who had a stroke screen and 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 9-1-1 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 based on two important clinical performance measures on stroke care described by EMSCompass. Importantly, there was poor performance of both with only 52.6% of all 9-1-1 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.

34. EFFECT OF INSTRUCTOR’S REAL-TIME FEEDBACK DURING LAPSEYR CARDIOPULMONARY RESUSCITATION TRAINING ON QUALITY OF CPR PERFORMANCES: A RANDOMIZED TRIAL

So Yeon Kong, Sang Do Shin, Kyoung Jun Song, Tae Han Kim, Gwan Jin Park, Department of Emergency Medicine, Seoul National University Hospital

Background: It was reported most bystander CPR does not meet high quality CPR criteria, strongly implying an urgent need for new strategies to assist in the improvement of quality bystander CPR. The aim of this randomized trial was to assess the effectiveness of instructor real-time, objective feedback during CPR training compared to a 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 training session, trainees performed a total of five CPR. The primary outcome was the total score, which is an overall measure of chest compressions quality. Generalized linear mixed models were used to analyze the outcome data from baseline to fifth CPR session for each group and individual-level covariates. Results: A total of 77 training sessions (1,894 trainees) 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, the CPR feedback significantly increased trainees’ overall quality of CPR performance compared with conventional feedback (p < 0.01). In terms of changes from baseline to last session, trainees in the intervention group demonstrated significant improvement on overall quality of CPR compared with those in the control group (QCPR feedback Δ = 11.64 (95% CI 9.75–13.53); Conventional feedback Δ = 6.96 (5.16–8.76); p < 0.001). A statistically significant difference between the two groups was observed for change in compression depth from baseline to fifth CPR session with mean change of 4.51 cm in intervention group and 2.72 cm in the control group (p < 0.001). Conclusions: Considering the rate of chest compression, we demonstrated statistically significant difference between two groups (p = 0.06). In this prospective randomized trial, instructor’s objective real-time feedback resulted in improved overall CPR quality.

35. CONFIRMING THE SAFETY AND FEASIBILITY OF A BUNDLED RESUSCITATION TECHNIQUE INVOLVING A HEAD-UP/TORSO-UP MECHANICAL CHEST COMPRESSION TECHNIQUE FOR CARDIOPULMONARY RESUSCITATION

Paul Pepe, Kenneth Scheppke, Peter Antey, Daniel Millstone, Charles Coyle, Craig Pundsack, Sebastian Garay, Johanna Moore, University of Texas Southwestern Medical Center

Background: Strategies to lower intracranial pressure (ICP) and improve cerebral/systemic perfusion during CPR have been tested as a way to increase post cardiac arrest survival rates. The use of devices to enhance venous return to the thorax. The purpose of this study was to evaluate the safety and clinical performance of a novel and innovative technique that combines mechanical CPR devices used at an angle. Methods: The EMS system catchment (pop. 1.4 million) is geographically expansive and includes urban and rural areas.
differences, extremes of age and socioeconomic and low frequency of bystander CPR. An established Usten-style registry, all out-of-hospital (OHOCA) cases (all rhythms) were followed over 3.5 years (Jan-
uary 1, 2014 through June 30, 2017; n = 2,585). EMS cases were previously using the Lucas device and impedance threshold device (ITD), but, after April 1, 2015, they also (1) applied O2 while determining the presence of venting and ITD application several minutes; (2) raised the backboard ~20° (head/torso-up) following ITD application; and (3) solidified the pilot-craw approach for device application. With neuro-
"short-term" survival (sustained resuscitation by EMS to hospital admission) was used for consistent comparisons. Quarterly reports were run to identify any periodic variations or incre-
mental effects during protocol transition (in Quarter 2, 2015). Results: There were no compli-
cations/difficulties in using the head/torso-
up device and impedance threshold device (ITD) bundle. EMS resuscitation rates were unchanged. EMS resuscitation rates in 2016 and 2017 were found to be proportional to non-intracranial dis-
dered to inferior cardiac etiology (p = .05). Logistic regression analysis revealed that EMS interac-
tions were associated with a higher NIHSS (p = 0.56). With appropriate prenoti-
tification was diagnosed in 52 of 107 instances (49%). Longer EMS LKN times were associated with a shorter time to diagnosis (p = .001). The use of CBRN PPE was a potential factor for prenoti-
tification (p = 0.405), holding and manipulating

37. Reprioritization of 9-1-1 Emergency Medical Calls Using Historical Clinical Data
Veer Vihalani, Sabrina Vlk, Steven Davis, Neal Richmond, Office of the Medical Director; MedStar Mobile Healthcare Category of Submission: Operations, Quality, Safety, Systems, Disaster
Background: Emergency Medical Services (EMS) systems often utilize a structured approach to 9-1-1 call-taking and emergency medical dispatch (EMD) of the system. The Primary Priority Dispatch System (PPDS), categorizes 9-1-1 calls into EMD codes based on problem and severity, with response priorities and resources determined at the local level. The aim of this study was to investigate whether the effect of prehospital AAM between regions due to medical resource

36. Intravenous Access Use in Chemical, Biological, Radiological, and Nuclear Personal Protective Equipment Tim Collins, Clinical & Medical Affairs, Teleflex Medical Category of Submission: Operations, Quality, Safety, Systems, Disaster
Background: To determine comparisons of survival and ease-of-use ratings in achieving intravenous access in both wearing and non-wearing of Chemical, Biological, Radia-
tional Hazardous Materials (CBRN) personal protective equipment (PPE) using a cadaver model. Methods: Using a cross over design, eight experienced paramedics inserted an intravenous (IO) device (Arrow EZ-JO) into a cadaver spec-
imen wearing their standard prehospital clothing. The sample then crossed over and applied CBRN PPE and repeated IO insertions. IO insertion times were recorded and assessed for clinical accuracy both before and after cross over with wearing CBRN PPE. Data collection involved the sample completing a confidential questionnaire assessing self-perceived ease-
of-use scores for IO access measured in Likert scale (0-100). Data was analyzed following structured focus group interviews.

35. Impact of Continuous ECG Monitoring and Adrenaline Administration on Initial Survival After Out-of-Hospital Cardiac Arrest: Multi-Level Analysis Dongsun Choi, So Yeong Kim, Tae Hyun Kim, Jeong Ho Park, Kyoun 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 oxygenation (p<0.001) of out-of-hospital cardiac arrest (OHCA) patients. 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 prehospital AAM on outcomes between regional EMS systems of four Asian cities. Methods: We used a PAROS (Pan-asia resuscitation outcome study) registry. We identified patients with OHCA of pre-
sumed cardiac etiology who were resuscitated by emergency medical services in four Asian cities between 2012 and 2014. Patients were witnessed by EMS personnel and age
under 18 years were excluded. The main expo-
sure variables were AAM. The primary end-
point was survival discharge and neurologic
recognition. No comparisons were made between
the AAM and non-AAM groups using multivari-
able logistic regression with an interaction term
between age and gender and analgesia admin-
istration. The adjusted logged odds of patients
receiving any analgesic was tested with bino-
minal logistic regression using a stepped mod-
eling approach. Results: A total of 59,962 cases
were available for analysis; median age was
50 years (IQR 39 years), 50.2% were female
(n = 30,077). The most common cause of trauma
was fall, representing 50% (n = 26,053) of cases.
14.1% of patients received any analgesia (n = 8,425). Caucasian patients have significantly
higher logged odds of receiving analgesia than
non-Caucasian patients (p < 0.001). When anal-
gesic administration was investigated for age cate-
gory and gender, African Americans have the
lowest logged odds of receiving any analge-
sia when compared to non-Caucasian patients
(p < 0.65, p < 0.001). Results: The conclusions:
indicating that symptoms were helped, and EMS
audit of cases to provide peace of mind, and feeling prepared
for emergencies. Post-encounter, 14/18 fam-
ilies rated the care received as “excellent,” and all indicated that symptoms were helped.
Seven families indicated that without the pro-
gram, they would have had their patient in
hospital. Five themes emerged: 24/7 availability, professionalism of paramedics, compassion of
paramedics, relief of pain, and a plea for program continuation. Thematic saturation was
reached with minimal divergence of comments.
Conclusions: The model of providing
 palliative support in the home resulted in
high patient/family satisfaction; registering in
the program, prior to any emergency, provides
peace of mind and a feeling of being prepared. Families particularly note the value of
24/7 availability, success in relief of symp-
toms, and the degree of compassion and profes-
sionalism of paramedics.

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

Giuseppe Ristagno, Francesca Fumagalli,
Weilun Quan, Giovanni Babini, Roberto
Lanfranchi, Yongjin Li, Roberta
Farmacologiche Mario Negri, Milan, Italy
CATEGORY OF SUBMISSION: CARDIAC

Background: Amplitude spectrum area (AMSA) is a predictor of successful defi-
rillation (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 and CPR was used. Forty-four pigs were subjected to different VF durations: 8–10 minutes (short), n = 12; 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 prior to a 150 J DF attempt. AMSA and changes in AMSA during CPR (AMSAD), in relationship with the duration of untreated VF, coronary perfusion pressure (CPP), and epinephrine administration.

Results: Overall AMSA decreased from 13.7 ± 0.8 mVHz to 6.5 ± 1.7 mVHz during the
15 minutes VF (AMSAD 7.2 mVHz ± 0.7,
p = 0.01), while it increased to 17 ± 1.2 mVHz after 5 minutes of CPR (AMSAD 10.5 ± 3.5 mVHz,
44. Prehospital Evidence-Based Guideline Implementation Methodology: A Systematic Literature Review

Jennifer Fishe, Remie Crowe, Rebecca Chen, Christian Martin-Gill, Christopher Richards. University of Florida COM Jacksonville, Department of Emergency Medicine Category or Submission: Operations, Quality, Safety, Systems, Disaster

Background: As prehospital research advances, evidence-based guidelines (EBGs) are increasingly implemented into EMS practice. However, incomplete 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 Gradung of Recommendations, Assessment, Development, and Evaluation (GRADE) methodology. PubMed®, EMBASE®, Scopus®, and Google Advanced SearchTM were searched without language or publication date filters for articles addressing prehospital EBG implementation. Conference proceedings, textbooks, non-English articles, and articles that did not address prehospital EBG implementation were excluded. GRADE was applied to remaining articles judged by three of five members of the Prehospital Guidelines Consortium Research Committee. Variations in ratings were resolved through majority. Results: The systematic literature review produced 1,575 articles, with 41 meeting inclusion criteria. Most 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 = 23, 56%). Salient findings included: (1) EBG adherence and patient outcomes depend upon successful implementation, (2) published studies generally lack detailed implementation methodologies, and (3) multiple barriers limit successful EBG implementation. Conclusions: Although this retrospective study is limited by incomplete demographic and dispatch data, we identified racial disparities in provision of DA-CPR instructions and subsequent CPR performance. Future research should address barriers, authority, and barriers to DA-CPR performance were recorded. Demographics including patient race (white, black, or other) and Utstein 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 that had dispatch, Utstein, and census tract data. The population was predominantly white (70%) and contained an average age of 63.5 ± 18.7. DA-CPR instructions were more commonly associated with an incident occurred in a 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)). Older patient age (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 1.3–3.0) and negatively associated with bystander CPR (ORadj 0.31; 95% CI (0.16–0.58)) but not significantly 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.

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 Swon. Oakland University William Beaumont School of Medicine Category or Submission: Student, Resident, Fellow

Background: Dispatch-assisted cardopulmonary resuscitation (DA-CPR) has been shown to improve prehospital cardiac arrest (OHCA) quality improvement programs in a medium-sized urban university with a college-based basic life support (BLS) system, 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 college-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 state mapping tools and the National Weather Service. Linear regression, logistic regression and bivariate correlation were used to determine correlations between environmental factors and patients-per-event presentation rates (PFR) to EMS during these events. Results: No calls for service occurred for any events with less 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 more than 1000 in attendance. Neither heat nor humidity was found to be significant predictors of PFR with p-values of 0.72 and 0.65, respectively. However, in the subset of events that attracted more than 1,000 people and were outdoor non-sporting events, the indoor non-sporting events, had an increased likelihood of calls for service (OR 4.4, p = 0.18). 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 be used to predict EMS resource utilization at MGEs. However, in indoor non-sporting events, an increased likelihood of calls for service (OR 4.4, p = 0.18). 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 be used to predict EMS resource utilization at MGEs. However, in indoor non-sporting events, an increased likelihood of calls for service (OR 4.4, p = 0.18). 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 be used to predict EMS resource utilization at MGEs. However, in indoor non-sporting events, an increased likelihood of calls for service (OR 4.4, p = 0.18). 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 be used to predict EMS resource utilization at MGEs. However, in indoor non-sporting events, an increased likelihood of calls for service (OR 4.4, p = 0.18). 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 be used to predict EMS resource utilization at MGEs. However, in indoor non-sporting events, an increased likelihood of calls for service (OR 4.4, p = 0.18). 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 be used to predict EMS resource utilization at MGEs. However, in indoor non-sporting events, an increased likelihood of calls for service (OR 4.4, p = 0.18). Outdoor sporting events, as compared to indoor sporting events, were also more likely to have requests for EMS (OR 6.1, p = 0.005).
the implementation of the form were evaluated. Metrics measured included the means and rates of goal achievement for compression depth, rate, and fraction as well as preshock pause time. Results: A total of 439 before encounters and 621 after encounters were evaluated including 53,063 AAM and 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. 80.4%; p< 0.001), compression rate (109.6/min vs. 114.8/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 compression depth (48.5% vs. 66.6%; 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 COUNTRY

Jeffrey Jarvis, Dustin Barton, Henry Wang, Williamson County EMS Category of Submission: MEDICAL

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 the number of AAM attempts within a national cohort of Emergency Medical Services (EMS) agencies. Methods: We used 9 years of data from a national electronic health record system. We included all encounters with attempted AAM. We examined the following subtypes: (1) cardiac arrest intubation (CA-ETI), (2) medical non-arrest intubation (NA-ETI), (3) rapid-sequence intubation (RSI), (4) sedation-assisted ETI (SAI), and (5) some type of supraglottic airway (SGA). Using binomial proportions with exact confidence intervals, we determined the cumulative success rate for each attempt. We also identified rates of first-pass success (FPS) and overall success (OS), and the number of attempts needed for the OS. Results: A total of 61,793 patients from 552 EMS agencies underwent AAM efforts, including 30,063 CA-ETI, 19,138 NA-ETI, 3,095 SAI, and 9,993 SGA. The number of AAM attempts per patient varied (median 1, range 1–10). CA-ETI performance was: FPS 66.3% (95% CI: 65.4–67.2%), 5 attempts to reach the OS threshold of 98.4% (79.6–81.1%). SAI performance was: FPS 66.9% (95% CI: 65.2–68.6%), 4 attempts to reach OS threshold of 86.9% (85.6–88.1%). SGA performance was: FPS 88.8% (95% CI: 88.1–89.4%), 5 attempts to reach OS threshold of 90.2% (92.6–93.6%). Conclusions: In this national cohort, first-pass prehospital success rates have improved from prior studies but are still low. Multiple attempts are common and often unsuccessful. These results may guide protocols limiting AAM attempts.

49. BENCHMARKING EMS COMPASS PERFORMANCE MEASURES USING A LARGE NATIONAL DASHBOARD: PEDIATRIC CARE

Jeffrey Jarvis, Dustin Barton, Lauren Sager, Nick Nuddell, Williamson County EMS Category of Submission: MEDICAL

Background: Children make up ~10% of all EMS transports, often require weight-based dosing, and are commonly affected by respiratory disease. Child EMS Compass performance measures address pediatric care, including documentation of weights, vital signs, and treatments for dysrhythmia. No benchmarks of these measures have been done on a national scale. We aim to describe these measures using a larger national dataset. Methods: Using a 6 ½ year sample of 9-4-1 EMS agencies using the ESO electronic health record (EHR), we calculated compliance rates among transported subjects. Using binomial proportions with exact confidence intervals, we determined the cumulative success rate for each attempt. We also identified rates of first-pass success (FPS) and overall success (OS), and the number of attempts needed for the OS. Results: There were 524,856 patient encounters. Of these, 287,719 (54% [54.7–55.0%]) had a documented weight. There were 43,027 children with a respiratory impression, 37,689 of these (87.5% [87.2–87.8%]) had at least one SpO2 and Respiratory Rate documented. 6,022 children had an impression of asthma, 75% of these (69.9% [68.7–71.1%]) received a beta-agonist. Of those children with an impression of asthma, 75% were hypoxic and had 0 spO2 [84.1% (81.5–86.7%)] of them received a beta-agonist.

Conclusions: These are the first benchmark data drawn from a national dataset against the EMS Compass measures. These results provide a starting point for quality improvement efforts and suggest areas for improvement in pediatric care. Only 55% of children had documented weights which are needed for correct medication 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

Background: To determine the feasibility of mobilizing AEDs to urban communities using the private taxi industry. Methods: A total of 109 surveys were completed (54.3% response rate), and 96 of those programs (88.1%) reported that their residents do 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 (56 programs, 57.7%) or online-based (75 programs, 79.2%) medical command training. EMS 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, 89.3%). 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 not routinely audited (51 programs, 53.4%). Conclusions: Most EM residencies train their residents in providing medical command, yet there is wide variation in how this is accomplished. Further research is required to make recommendations for a more uniform system of resident command training.

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

Abagyle Renko, Nicholas Julius, Chadd Nesbit

Background: Training Emergency Medicine (EM) residents provide medical oversight as a requirement for EM residency accreditation through the Accreditation Council for Graduate Medical Education (ACGME). EMS agencies in the state of Georgia have chosen to train residents to develop this essential skill set 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 via the Research Electronic Data Capture (REDCap) program. The survey contained questions on demographics, general facility and program descriptors, medical command training procedures, personnel providing command, resident oversight, and feedback. Descriptive statistics were collected and analyzed using chi-squared tests for categorical variables. Results: A total of 109 surveys were completed (54.3% response rate), and 96 of those programs (88.1%) reported that their residents do 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 (56 programs, 57.7%) or online-based (75 programs, 79.2%) medical command training. EMS 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, 89.3%). 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 not routinely audited (51 programs, 53.4%). Conclusions: Most EM residencies train their residents in providing medical command, yet there is wide variation in how this is accomplished. Further research is 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 OF 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 Fieseler, Morrison Medical Center

Background: A two-tiered EMS system has the advantage of incorporating volunteer, public, and private BLS ambulances into the system to decrease the 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. To date, no studies have evaluated 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 order to make safer triage decisions, we sought to describe this “near-miss” misdiagnosed population of patients who were ultimately deemed to be critically ill by Emergency Departments and had the potential to decompensate quickly.

Methods: Setting: A suburban two-tiered EMS system in which ALS triage approximately 14,000 patients per year. Patients: All patients from 2007–2015 “released” to BLS, transported to an Emergency Department, and subsequently admitted to an ICU, Cardiac Catheterization Lab, or OR. Protocol: Demographics, history of present illness, vital signs, GCS, disposition, final diagnosis, and interventions done prior to EMS arrival and by EMS personnel were extracted via chart review and 95% Confidence Intervals calculated when appropriate.

Results: Out of 17,639 patients from 2007–2015 who were evaluated by ALS and triaged to BLS, 372 patients (2%) were misdiagnosed to BLS. The average age of patients was 66.4 years CI (61.0–71.7) and 52% were female. The most common misdiagnosed final diagnosis category was Neurological, 24% CI (23.3–24.7), followed by Gastrointestinal/GI Emergencies to avoid near misses in the ED, and the sensitivity, specificity, and knowing an EMS provider who committed suicide were not found to be statistically significant predictors of suicidality. Conclusions: High rates of suicidality exist within the EMS community; however, further research on risk factors and potential solutions needs to be conducted.

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 Saksun, Damon Scales, Institute of Health Policy, Management and Evaluation, University of Toronto

Background: Sepsis is a life-threatening syndrome where earlier recognition and prompt intervention is critical to improving patient 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 infection mortality and validate the accuracy of published paramedic screening strategies for sepsis within a cohort of Emergency Medical Services (EMS) paramedics.

Methods: A previously published systematic review that identified strategies for paramedic identification of sepsis was updated to be the source for paramedic screening strategies. A one-year cohort of EMS data linked to in-hospital administrative databases (n = 131,743.99% linkage rate) was used for the cohort of EMS patients. Sepsis was identified by Emergency Department (ED) International Classification of Disease v.10 Canadian (ICD-10CA) diagnosis codes, 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 were identified in the literature. The PRESS, HEWS (score of 2 or ≥2), and Robson scores had the highest sensitivities (0.986(0.98–0.99), 0.870(0.86–0.88), and 0.741(0.72–0.76), respectively, and lowest negative LR [0.08(0.04–0.08), 0.270(0.24–0.30), and 0.380(0.37–0.42), respectively] for ruling out sepsis. The Positive Predictive Value (PPV) for threat of suicide attempt and Sepsis Alert strategies had high specificity [0.980(0.98–0.98) and 0.990(0.99–1.01)], and positive LR [19.17(12–22) and 13.6(11.6–16.0)] for ruling in sepsis, but lower sensitivity [0.540(0.53–0.63) and 0.070(0.00–0.08)]. Comparing the cSFINA score recommended in the Sepsis-3 definition to the previously recommended SIRS score, cSFINA was better for ruling in sepsis (Positive LR 9.85(9.7–2.72) vs. 2.76(2.63–2.81), while SIRS was better for ruling out sepsis [negative LR 0.67(0.65–0.67) vs. 0.73(0.72–0.74)]. Conclusions: 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 diagnoses.

55. PRELIMINARY IMPACT OF ADDING FOLLOW-UP HOME VISITS ON CALLED VOLUMES GENERATED BY EMS “SUPER- USERS” ENROLLED IN A NEW MOBILE INTEGRATED HEALTH PROTOCOL

Roger Stone, Jamie Balitrosky, Alan Butsch, Ashley Robinson, Barbara Trotter, Montgomery County Md Fire Rescue Services

Background: Rising EMS call volumes tax resources in many jurisdictions. A significant contributor to volumes includes the frequent 9-1-1 callers, some of whom may return home from hospitals with limited resources. After a new partnership in 2015 between EMS and our County’s HHS agency helped facilitate services for 9-1-1 “Super-users”, our previous study found a preliminary association with reduced call volumes. Our agency has now partnered with discharging hospitals to start a harm reduction program for new Mobile Integrated Health (MIH) protocol beginning March 2017. We wished to establish if this additional intervention was associated with a reduction of EMS call volumes from enrollees in the protocol. Hypothesis: Initiation of follow-up home visits by our paramedics and hospital outreach nurses has an impact on EMS utilization by a selected group of enrolled 9-1-1 callers.

Methods: Among our EMS-HHS partnership identified 9-1-1 callers, we recruited a voluntary cohort to enroll in the MIH program. We retrospectively measured using CAD and EMS records cumulative call volumes for the group of new enrollees, 90, 60, and 30 days before and after the home visits program started.

Results: (N = 10) was enrolled in the MIH protocol and scheduled for home visits beginning March 1, 2017. Cumulatively, those patients generated 63, 53, and 30 calls during the periods 90, 60, and 30 days, respectively, prior to the home visit. Thereafter, those calls decreased to 7, 8, and 18 calls for the periods of 30, 60, and 90 days, respectively, after visits began. The change yields 9-1-1 call reduction of 77%, 85%, and 71% during the post intervention three months.

Conclusions: We believe super users in our large system benefit from a coordinated program of the EMS partnerships with health agencies and hospitals. A new partnership with Hospital Outreach and the initiation of follow-up home visits had preliminary impacts on call volumes generated by the enrollees over a 30–90 day period. More studies are needed to prospectively prove value, sustainability and best practices of these programs, and which interventions during home visits make the most difference.

56. MULTI-DISCIPLINARY COMMUNITY HEALTH CARE JOURNEY: TO REDUCE EMS UTILIZATION BY ELDERLY

Joseph Petrosino, Jeffrey Boyd, Joanne McGovern, James Dziura, Gina Stover, Montgomery County Md Fire Rescue Services

Background: Rising EMS call volumes tax resources in many jurisdictions. A significant contributor to volumes includes the frequent 9-1-1 callers, some of whom may return home from hospitals with limited resources. After a new partnership in 2015 between EMS and our County’s HHS agency helped facilitate services for 9-1-1 “Super-users”, our previous study found a preliminary association with reduced call volumes. Our agency has now partnered with discharging hospitals to start a harm reduction program for new Mobile Integrated Health (MIH) protocol beginning March 2017. We wished to establish if this additional intervention was associated with a reduction of EMS call volumes from enrollees in the protocol. Hypothesis: Initiation of follow-up home visits by our paramedics and hospital outreach nurses has an impact on EMS utilization by a selected group of enrolled 9-1-1 callers.

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Conclusions: We believe super users in our large system benefit from a coordinated program of the EMS partnerships with health agencies and hospitals. A new partnership with Hospital Outreach and the initiation of follow-up home visits had preliminary impacts on call volumes generated by the enrollees over a 30–90 day period. More studies are needed to prospectively prove value, sustainability and best practices of these programs, and which interventions during home visits make the most difference.
Background: Previous studies in a small, suburban town showed that more than half of elders who fall and require lift assistance 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 assistance calls. This study was designed to evaluate these findings across larger and more diverse populations of elders at risk for falls.

Methods: For this non-randomized, prospective study, informed consent to follow subsequent health care 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 eligibility and home safety, a visiting nurse assessing for home health care requirements and eligibility, plus an offer of free transportation to a community identified as a Provider Impression was "Cardiac Arrest." The records were individually examined to determine the EIC02 readings and whether these patients received NaHCO3. Results: A total of 182 OHCA cases were selected which had a documented EIC02, 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 EIC02 readings between the two groups, with a mean EIC02 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 EIC02 readings, the significance was even greater, with a mean of 29.9 mmHg in the NaHCO3 group and a mean of 27.7 mmHg in the non-NaHCO3 group, with a p-value of 0.0018. When the EIC02 readings were less than 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 EIC02 readings in TOR decisions is unclear. This study indicates that administering NaHCO3 during OHCA was significantly elevate the EIC02, and NaHCO3 administration does not reduce the utility of EIC02 when levels are above 20 mmHg. Further study of the use of EIC02 in TOR decisions is necessary.

58. FEASIBILITY OF RECORDING OUT-OF-HOSPITAL CARDIAC ARREST TREATMENTS VIA A MOBILE SMARTPHONE APPLICATION

Samuel Sondheimer, Joseph Devlin, William Seward IV, Aaron Bernard, Richard Fein, David Cone, Frank H. Nettler MD School of Medicine, Quinnipiac University Category of Submission: STUDENT, RESIDENT, FELLOW

Background: The demanding nature of out-of-hospital cardiac arrest (OHCA) resuscitations, recording 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 whether it is necessary to use the FCP recording functions accurately and safely without compromising patient care. Program evaluation was assessed via participant feedback surveys, data accuracy, delays between recording and performing interventions, and delays in care attributed to using the application, stratified by group size. Methods: Simulations of a standard OHCA scenario using the Gaumard TraumaHab mannequin and a dedicated iPhone 5 pre-loaded with FCP version 3.4 were run with group sizes of 2-6 participants, with group sizes determined by participant availability. Participants were required to use the FCP recording functions accurately and safely without compromising patient care. Program evaluation was assessed via participant feedback surveys, data accuracy, delays between recording and performing interventions, and delays in care attributed to using the application, stratified by group size. Results: Simulations including 142 participants. The feedback survey questions achieved a Cronbach's alpha of 0.91 indicating high reliability, and the study demonstrated a linear trend supporting greater satisfaction with FCP as group size increases (p < 0.001). Similarly, increasing group size did not negatively impact the number of interventions recorded (p = 0.009) and fewer missed and false recordings (p = 0.002). Delays revealed significant linear trends (p = 0.018 for delays in recording and p < 0.05 for delays in care), with size corresponded with lesser delays. Greatest improvement was noted to be between groups of 2 and 4 participants. OHCA simulations using FCP demonstrated increased provider comfort, increased recording accuracy, and decreased delays, with size increased. While the application may improve recordings for PCRs and future research, the data suggest a sufficient number of providers (>3) should be present to achieve reliable data without compromising patient care.

59. INFLUENCE OF NEIGHBORHOOD SOCIOECONOMIC STATUS ON DISPARITIES IN EMERGENCY MEDICAL SERVICES USE AND QUALITY OF PREHOSPITAL CARE FOR ISCHEMIC STROKE

Timmy Li, Manish Shah, Adam Kelly, Jeremy Cushman, David Rich, Edwin van Wijngaarden, Gina Lovasi, respectively, Well Health Category of Submission: STUDENT, RESIDENT, FELLOW

Background: A minimal amount is known regarding the effect of neighborhood socioeconomic status (nSES) on emergency medical services (EMS) use and quality of prehospital stroke care. We assessed the association between nSES and EMS use, decision delay time, 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-kilometer buffer 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 quintiles. 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) dispatched EMS level of care, 2) EMS response time, 3) EMS on-scene time, (4) Cincinnati Prehospital Stroke Scale (CPSS) assessment, and (5) hospital triage and transport by EMS. Results: Among 814 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, 2.60), 2.91 (95% CI: 2.08, 4.21), and 3.39 (95% CI: 2.30, 4.99) for nSES quartiles 2, 3, and 4 (lowest nSES, respectively). nSES was not significantly associated with other outcomes. Conclusions: Among a sample 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.

60. PARAMEDIC RECOGNITION OF PAROXYSMAL SUPRAVENTRICULAR TACHYCARDIA

Spencer Sample, Colleen Shortt, Erich Hanel, Michael Thrift, Michael Mohl Med School of Medicine, McMaster University, Hamilton, Ontario
Background: Paroxysmal supraventricular tachycardia (PSVT) is a common group of arrhythmias that Advanced Care Paramedics (ACPs) can often manage with vagal maneuvers, adenosine, and/or cardioversion, provided that they correctly identify the rhythm. The purpose of this study is to determine the accuracy of ACP identification of PSVT.

Methods: Following ethics approval, all calls with 31 years or older with a 12-lead ECG available, who were assessed 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 a 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 consensus. Results: Of the 442 patients included, 197 (44%) were male and the median age (Interquartile range [IQR]) was 70.0 years (51.2-80.0) and identified 74 (16.7%) patients as having PSVT. Of these, 48.5% had a history of previous arrhythmia, compared to 31.2% who had no ACP identified PSVT (p = 0.026). They were also significantly younger [median(IQR) = 63.0 (47.0-72.0)] compared to those without ACP identified PSVT [median(IQR) = 72.0 (61.0-85.0)] (P < 0.0001). Sensitivity of ACP identified PSVT was 97.9% (95%CI:88.8–99.9%) and specificity was 90.6% (95%CI:87.3–93.3%). The positive predictive value (PV) of ACP identified PSVT was 48.6% (95%CI:41.1–56.3%), the negative predictive value (PVN) was 99.7% (95%CI:98.1–99.9%), the positive likelihood ratio (LR) was 10.4 and the negative LR was 0.03. Moderate inter-rater agreement was seen between initial ECG interpretations [kappa (95%CI) = 0.24, 95%CI:0.29-0.34] by the fellow and prehospital physician, while agreement was higher (good) between the two prehospital physicians [49/55 (89.1%) (kappa = 0.70, 95%CI:0.48-0.92)]. Conclusions: These results indicate that ACPs are adept at identifying PSVT, but are prone to false positives. Given the relatively good sensitivity and specificity seen in this investigation, future standardization of ACP recognition of specific rare arrhythmias (antidromic accelerated atrial fibrillation) 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, Lauren Reeves, Alejandra Mora, Joseph Maddy, Craig Manifold, San Antonio Uniformed Services Health Education Consortium Category of Submission: STUDENT, RESIDENT, FELLOW
Background: Tactical Emergency Medical Services (TEMS) is a growing subspecialty of prehospital care. Tactical providers are ideally suited to respond to the call of incidents in areas traditional EMS cannot enter. A minimal amount is currently known regarding the clinical impact of these programs. This study examines patient outcomes of those treated by a Police based TEMS system vs. traditional EMS. Methods: The study cohort consists of 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 were removed. computer automated dispatch (CAD) system was used to identify all cases from 2011–2015. The TEMS and EMS records for cases 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/type, age, and INS as a stratified comparison between EMS and TEMS records (21) 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 2243 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: 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. Final hospital disposition and hospital resource utilization were comparable. Both had similar lengths of ventilation, ICU, and hospital days. There was no difference in mortality rates. Conclusions: In this study, TEMS providers exhibited shorter response times and performed interventions at similar rates to traditional EMS. Although no differences in patient outcomes 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 unfavorable OHCA outcomes associated with mechanical CPR. We hypothesized that an EMS system with optimized deployment, sustained ROSC and survival to hospital discharge for OHCA patients managed with and without mechanical CPR. Methods: In 2015, we initiated a quality improvement process to choreograph and optimize deployment of mechanical CPR. All primary first response agency (attending) reported activation of OHCA (which is field personnel attended in-person training and practiced 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 adult, non-traumatic OHCA attended by the first responding agency in 2016. During the study period, mechanical CPR devices were deployed on some—but not all—first response units; traditional CPR was based primarily on availability and/or whether patients achieved ROSC after initial resuscitation attempts. We therefore used propensity score matching to select cases with and without mechanical CPR that had similar patient demographics and arrest characteristics. We excluded women (5.7% vs. 13%) and patients who achieved ROSC following only CPR or defibrillation without medication administration, terminations of resuscitation without successful resuscitation attempts (including DNARs), and EMS-witnessed arrests. All prehospital data were obtained from the EMS electronic health record; hospital outcomes were obtained from receiving hospitals. Results: Of 444 eligible OHCA, 209 received traditional CPR, 217 received traditional CPR, 154 with mechanical CPR, and 217 with mechanical CPR were also less likely to be witnessed arrests and less likely to present with ventricular fibrillation. In the propensity score 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: −9.9% 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 X-SEGMENT ELEVATION MYOCARDIAL INFARCTION PATIENTS
Krystal Baciak, Stephen Sanko, Marc Eckstein, University Of Southern California County And Los Angeles Fire Department 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 delay EMS 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 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-door time (E2B). Our exclusion criteria were: interfacility transfer, age under 18, inability to calculate E2B, and missing gender data. 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. The women had longer on-scene times, longer times from 9-1-1-call to arrival at the SRC, time from first medical contact (FMC) 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 statistically significant difference (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 arrival, EKG-to-balloon or door-to-balloon (p > 0.01). Conclusions: Our study demonstrates women were more likely to delay times from 9-1-1-call to hospital arrival, FMC-to-balloon, and from 9-1-1-call to EKG, but do not have a delayed E2B or door-to-balloon time. Limitations include short transport times, a single urban EMS service, and the retrospective nature of the study.
64. STATEWIDE RETROSPECTIVE ANALYSIS ON THE CHARACTERISTICS OF EMS REFUSALS OF CARE
Noievee Sahu, Patrick Matthews, Ross Megargel, Rutgers University-New Jersey
Background: Improving EMS systems of care requires a better understanding of out-of-hospital cardiac arrest. 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 retroactively 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. 8.6% vs. 10%, p < 0.001). Men had a greater refusal rate than women (8.5% vs. 7.3%, p < 0.001). Diabetes-related problems (36.2%) and motor vehicle accidents (28.5%) resulted in the highest rates of refusal of care (p < 0.001). The highest percentage of overall refusals occurred during mid-summer time of year (8.8%, p < 0.001). Locations of care which include places of recreation and bodies of water had the highest refusal rates (45.6%). Conclusions: In this population, geriatric patients had lower refusal proportions; whereas, prior studies suggested that geriatric refusal numbers are greater than other age groups. Patients >65 years of age had a lower refusal rate among men is consistent with previous literature. Prior studies have shown the highest rates of refusals for motor vehicle accidents and other trauma, 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 Fitzgibbon, Emily Lovallo, Marek Radoszewski, Esajjeziz Christian–Martin–Gill, Department of Emergency Medicine, University of Pittsburgh School of Medicine Category of Submission: Cardiac

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 its prehospital use by users with limited ultrasound experience. We aimed to determine the feasibility of using POCUS during OHCA by resident and fellow physicians studying a 24/7 prehospital response vehicle and identify barriers to its use. Methods: We deployed a portable ultrasound device (Viz, by SonoSite) by prehospital physicians at OHCA in an urban EMS system. All physicians received POCUS education as part of graduate training, and were provided an instructional video on the use of the Viz device. POCUS use was limited to identifying cardiac motion during pulse checks, without interrupting resuscitation, and the results could be used to guide management at the physicians’ discretion. Data were recorded prospectively by saving the video and still images on the device and through a custom electronic form within the patient care report (emCharts). The primary measure was the frequency of use of POCUS during OHCA. Secondary, we characterized image quality by expert (ultrasound fellowship trained) face validity review (using kappa statistic for agreement), and identified barriers to the use of prehospital POCUS. Results: From November 2015 to September 2016, 348 physicians field responses were reviewed, including 127 cases of OHCA, and 56 (44%) cases with POCUS performed. Still video images were recorded in 48 (86%) cases and video in 34 (61%) cases. From video images, agreement in identifying cardiac motion between prehospital physician and expert reviewer occurred in 91% of cases (K = 0.82). Reasons cited 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 after use. 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, Michelle Kaczmarz, Laurey Steucher, Robert Swor, Beaumont Health Category of Submission: Student, Resident, Fellow

Background: Optimal treatment ischemic stroke caused by 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 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 of patients 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 time intervals including transport time, time from decision to transfer (access), and time from arrival to first ED to 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 vs. 30.0 minutes, p = 0.013). There was no difference between transfer decision-CSC ED arrival between air and ground (65.5 vs. 67.5 minutes, p = 0.967, respectively). In hospital processes for air and ground transfer patients did not differ but not significantly, so CSC door-time (2.5 minutes vs. 16.5, p = 0.44) and CSC door to access (28.0 vs. 40.5, p = 0.44). Time from decision to ground trans- fer were not different for arrival to 1st ED to access (155.3 vs. 172, p = 0.118 or arrival - reper- fusion (289.3 vs. 21.1, p=0.495). Conclusions: In our small study, despite shorter transfer times, there was no significant difference between air and ground transfer from decision to transfer at CSC. In the time from first hospital to access or reperfusion. Assessment of unmeasured intervals are needed to assess the optimal method for inter hospital transfer of critical patients.

67. PATIENT PREFERENCES TOWARD EMERGENCY MEDICAL SYSTEM PROVIDER ATTIRE

Jesse Olsen, Jeffrey Lubin, Khaled Iskan- darani, Penn State College of Medicine CATEGORY OF SUBMISSION: OPERATIONS, QUALITY, SAFETY, SYSTEMS, DISASTER

Background: In a healthcare 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 attire impacts 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 a field, no studies have addressed patient perception of attire. This prospective study addresses how EMS attire influences patient perception of care through five different variables: like-ability, trust, confidence, willingness to confide, and intelligence. Methods: Over six weeks in the Emergency Room at Penn State. In total, 165 surveys were completed evaluating a team of two EMS providers. Participants surveyed viewed one of three two-minute videos of EMS teams responding to a patient with chest pain. 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 providers 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, likeability or confidence. However, participants answered significantly lower on the Likert scale for willingness to discuss confidential information with the providers in the turnout gear compared to the other two attires (p = 0.007). Conclusions: Based on our results, EMS provider attire does not impact patient perceived quality of care. Lower responses were found for turnout attire, possibly from a lack of association of EMS providers with fire gear. Studies drawing a larger sample, and those that analyze more outfits or assess provider appearance would lend support to this conclusion. Our study was small, limited by length of the videos, so our results were not tested but our results conclude attire as a minor factor in EMS responses.

68. MULTIVARIABLE ANALYSIS OF FACTORS ASSOCIATED WITH EMS NON-TRANSPORTS

Rickquelle 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, decreased liability, and non-payment. Yet, few rigorous studies have identified risk factors for non-transported EMS. We aimed to identify demographic and clinical characteristics predictive of non-transports using a large database of out-of-hospital EMS provider responses. Methods: We retrospectively reviewed consecutive patient care records from 21 urban, suburban, and rural EMS agencies in Western Pennsylvania from April 2013 to December 2016. We identified age, gender, race, ethnicity, level of transport,
last vital signs (BP, RR, HR, SPO2, and GCS), loss of consciousness (LOC), abnormal mental status (AMS), medical category, and time of day. We excluded cases of cardiac arrest, interfidelity/scheduled transports, EMS assist, no patient encountered, and patients aged <18. For non-transports, we described the incidence of protocol-defined abnormal vital signs (HR <50, >100; SPO2 <100, >195; RR <12, >24; BP <95, >120). LOC, and AMS. We used unadjusted and adjusted logistic regression to identify independent predictors of non-transports. Results: We identified 385,908 cases meeting study criteria, with 35,266 (9.1%) non-transports. Patient characteristics were: median age 76 (IQR 61-87) years, 52% male, 16.8% Black, 0.7% Hispanic, and 96.3% advanced life support (ALS). Incidence of abnormal vital signs was HR (N = 4435, 12.6%), SPO2 (N = 539, 1.5%), DBP (N = 1324, 3.8%), RR (N = 159, 0.5%), SpO2 (N = 1543, 4.4%), and GCS (N = 87, 2.4%). There were 785 (2.2%) with LOC and 2031 (5.8%) with AMS. In adjusted multivariable analysis, we identified associations with non-transports were trauma (2.37, 1.79–3.14), dizziness/syncope (1.80, CI 1.49–2.20), and allergic reaction (OR 1.54, CI 1.33–1.79). Race, ethnicity, LOC, and AMS were not associated with the incidence of non-transports. Conclusions: Patients not transported by EMS often have abnormal heart rate and are associated with complaints of trauma, dizziness/syncope, or allergic reaction. This information can guide patient refusal protocols and future research on outcomes of these at-risk patients.

69. AMONG STEMI PATIENTS, IS INFERNAL ST ELEVATION ASSOCIATED WITH A HIGHER FREQUENCY OF HYPOTENSION AFTER FIELD NITROGLYCERIN?

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Background: Patients with inferior STEMI involving the right ventricle are believed to be at a higher risk of hypotension after nitroglycerin (NTG). The objective of this study was to determine if inferior STEMI is associated with increased risk of hypotension upon ED arrival in patients treated with NTG by EMS.

Methods: Consecutive adult patients with suspected STEMI transported by EMS to one of three participating PCI-capable hospitals were prospectively identified and maintained in a log during an 18-month period. Investigators reviewed records for initial field and ED vital signs, field NTG treatment, and hospital outcomes. Inter-rater reliability was assessed on a random 10% sample of records using the kappa statistic. Patients with a hospital diagnosis of STEMI treated with NTG were included. Patients with no diagnosis on EMS arrival were excluded. Inferior STEMI was defined as ST-elevations in the inferior leads on the prehospital ECG. The frequency of hypotension was compared with Fisher’s exact test and change in SBP with Hodges-Lehmann’s median difference. Results: Of 339 patients with STEMI, 46 were excluded for initial hypotension and 38 did not receive NTG; thus, 155 comprised the study cohort. Median age was 61 years; 71% male. Hypotension occurred in 10 (14%) with inferior STEMI and 3 (4%) with non-inferior STEMI (p = 0.04). Inferior reperfusion efficacy was excellent, kappa 0.93 (95% CI 0.80, 1.0). Mean decrease in SBP was −15 ± 22 mmHg and −10 ± 20 mmHg in inferior and other STEMI, respectively, median difference in the decrease in SBP −4.3 mmHg (95% CI −12.0, 3.0). Compared to patients matched with PCI in any other location, hypotension after NTG among patients with proximal or mid RCA lesions was similar, RR 1.0 (95% CI 0.9, 1.1) p = 0.6.

Conclusions: When compared with other STEMI patients, those with inferior STEMI had a slightly higher risk of mild hypotension after field NTG. RCA lesion location was not associated with an increased risk.

70. CHARACTERISTICS OF EMERGENCY MEDICAL TECHNICIAN GRADUATES UNSUCCESSFUL ON THE NATIONAL CERTIFICATION COGNITIVE EXAMINATION

Rebecca Cash, Remle Crowe, Madison Rivard, Ashley Larrimore, William Krebs, Jeremy Miller, Ashish Panchal, National Registry of Emergency Medical Technicians CATEGORY OF SUBMISSION: MEDICATION SAFETY SYSTEMS, DISASTER, DISASTER

Background: Research on EMT student performance has focused on pass rates and characteristics related to success. Conversely, a minimal amount is known regarding EMT graduates who were unsuccessful at passing the examination. The objective of this study was to describe demographics and performance of graduates unsuccessful on the computer adaptive National EMT Certification examination. We hypothesized that the majority of candidates who are unsuccessful on the examination are close to the passing standard (maximum length testers) and would be likely to retest. Methods: 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 120 questions. Unsuccessful test takers 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 testing 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 = 7,257, p = 0.58). More than one-third of unsuccessful candidates received the maximum number of questions (36%, n = 7,128) while 38% received the minimum number of questions. Of those unsuccessful on the first attempt, 66% (n = 13,111) attempted a second examination attempt. More maximum length testers attempted a second examination compared to minimum length testers (72%, n = 5,156 vs. 60%, n = 4,763, p < 0.001). Conclusions: First-time candidates unsuccessful on the National EMT Certification cognitive examination attempted a second examination attempt. A portion of those close to the passing standard (maximum length testers) retested. Future work is needed to better understand the reasons behind candidate retesting including personal and educational experiences.

71. INTERFACILITY TRANSFER OF THE PREGNANT PATIENT: A 5-YEAR RETROSPECTIVE REVIEW OF A SINGLE ACUTE CARE FACILITY BASED CRITICAL CARE TRANSPORT PROGRAM

Philip Nawrocki, Asa Margolis, Shawn Beast, Matt Levy, Johns Hopkins Lifeline CATEGORY OF SUBMISSION: STUDENT, RESIDENT, FELLOW

Background: Interfacility transport of pregnant patients involves unique challenges and considerations. Data from the National Emergency Medical Services Information System (NEMSIS) dataset indicate that 0.6% of all EMS transports and 0.6% of interfacility transports involve pregnant patients. Limited information exists surrounding the safety and adverse events of this patient population in the out-of-hospital setting. This study aimed to examine clinically significant adverse events that occur during the interfacility transport of pregnant patients. Methods: A retrospective review of quality assurance data was performed. The study population consisted of pregnant patients transported to the labor and delivery department of two hospitals within an academic quaternary-care hospital system between January 2012 and December 2016. Primary outcomes (adverse events) were defined as: hypotension, respiratory distress, exacerbation of hypertensive disease of pregnancy (preeclampsia, eclampsia), need for vasoactive medications, dysrhythmia, intubation or unintended extubation, change in mental status, need for restraints, cardiac arrest or death, and delivery during transport. Use of online medical direction and reason for consultation were secondary outcomes of interest. Results: Our critical care transport system performed 30,181 total interfacility transports within the five-year study period. 709 patients (2.4%) met inclusion criteria. Clinically significant adverse events occurred during 32/709 patient transports (4.5%). The most frequent events were: exacerbation of hypertensive disease requiring intervention (25), hypotension (4), and altered mental status (2). There were zero instances of cardiac arrest, death, or delivery during transport. Conclusions: Interfacility transport of pregnant patients is a common occurrence that involves unique challenges and risks. Within the experience of this critical care transport program, significant adverse events were identified in 4.5% of transported patients over a 5-year period. This data will help guide the training of prehospital providers and the formation of protocols to mitigate and respond to these events. Notable limitations include the use of data from a single system, absence of scene transports, and use of paramedic/nurse crew configuration.

72. ADVANCED PROVIDER RESPONSE UNIT (APRU), AN ANSWER TO LOW-ACUITY 9-1-1 CALLS?

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Background: The Los Angeles Fire Department (LAFD) has experienced an unsustainable increase in 9-1-1 calls. Over the past 2 years, call volume rose by 14%; vastly higher than the historical rate of increase of 1-2%. This increase was not accompanied by the increasing call volume, while still providing care for the citizens of Los Angeles, the LAFD launched the APRU (Advanced Provider Response Unit), a specialized ambulance staffed by a licensed advanced practice
provider (APP) and a firefighter/paramedic with the mission of treating and releasing patients on scene and 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 88 weeks. Enrolled patients with either low-acuity 9-1-1 or other 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 care was transferred to another transporting unit, 360 (42.6%) were treated and released on scene, and 100 (11.9%) were treated and transported. Of the 100 transported by the APRU, 58 were transported to a non-emergency room 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 ED care. Furthermore, by leveraging the diagnostic skills of the APP, patients can be treated and released on scene or medically 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

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Background: Unbiased estimates for field triage guideline performance are important in optimizing trauma systems and improving outcomes among seriously injured patients. The field triage guidelines have not been evaluated in traumatic brain injury (TBI) patients. Based on evaluation as a diagnostic test, the field triage guidelines standard to mortality and disability, which is the final hospital outcome. The aim of this study is to predict the performance of each component of field triage guidelines on hospital outcomes in TBI patients.

Methods: This was a cross-sectional observational study using 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 2013. The main exposure was each component of field triage 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 disability or worse Glasgow Outcome Scale (GOS) including death than pre-event GOS. Sensitivity, specificity and area under the curve (AUC) were calculated. Results: Total 5,133 patients met the exposure and 2,153 (42.4%) had severe TBI. Of these, 1,991 (91.4%) and 31.4% of patients had disability. The sensitivity and specificity for mortality of the physiological, anatomic and mental criteria were 91.4% and 47.3%, 20.0% and 93.1%, 57.8% and 89.3%, respectively. Among each component of criteria, altered mentality showed highest sensitivity and AUC for mortality, which was 89.2% (95% CI 89.2% to 89.2%) and 0.687 (95% CI 0.705 to 0.711). Amputation and chest wall instability in anatomic criteria showed highest specificity (93.2% and 99.2%, 95% CI 99.2% to 99.9%) and converted mentality showed highest sensitivity and AUC for disability, which was 75.9% (95% CI 75.9% to 75.9%) 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, Allison Koller, Renia Sufrin, 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 (EKG) waveform is known to deteriorate over time if untreated, recover with CPR, and to predict defibrillation success. 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 during VF ECG waveform characteristics in a swine cardiac arrest model.

Methods: Twelve mixed-breed domestic swine were sedated (ketamine & xylazine), anesthetized (fentanyl) and paralyzed (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, Inc) at 1000 Hz. Ventricular fibrillation was induced with a 3-second 100 mA trans-thoracic 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 5x1-minute intervals per phase while holding the other 2 parameters fixed. Frequency (AMSA) and slope-based (MS) quantitative ECG characteristics of artifact-filtered ECG were calculated from 3-second segments at the end of each 1-minute inter-vall and compared between rate, depth and DC schemes, as well as experimental phases. Results: 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 1, however neither DC nor depth showed a correlation with either AMSA or MS. In ANOVA models, MS differed between CPR groups at the end of Phase 1, however not AMSA, suggesting limited response of quantitative ECG measures after extended time intervals. Conclusions: In this study only chest compression rate in early phase CPR 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 Chiosta-McCollum, Elizabeth Hundt, George Lindbeck, Karen Johnston, 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 messages and timely treatment of acute stroke.

Methods: This study was conducted at an academic medical center that is a designated 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). The type of stroke (hemorrhagic vs. ischemic) was identified and the NIHSS measured in the ED for all stroke patients, with the ICH Score and Hunt & Hess Score determined for ICH and SAH respectively. Age, gender, PMH of stroke and time to treatment were recorded. A total of 955 patients were enrolled with 715 (77%) arriving by EMS and 219 (23%) arriving by private vehicle of these, 636 (68%) were from EMS and 190 (21%) had ICH, 92 (10%) had SAH, and 17 (2%) were not classified. Ac greater proportion of ICH (93%) and SAH (93%) patients versus ischemic stroke patients (69%) arrived by EMS (p < 0.001). Patients arriving by EMS had significantly higher NIHSS (9.2 vs. 2.7, p < 0.001), ICH scores (1.7 vs. 0.3, p < 0.001), and Hunt & Hess scores (2.8 vs. 2.0) than those arrive by car. The “last known normal” time was significantly lower for the EMS arrival group (mean = 547 minutes; median = 211 minutes) than the private vehicle group (mean = 1,407 minutes; median = 215 minutes; p < 0.001). Demographic data and prior history of stroke were similar based on mode of arrival. Conclusions: Stroke patients arriving by EMS have significantly higher NIHSS, ICH score, and Hunt & Hess score and significantly shorter time from “last known well” than those arriving by car. Because a significant proportion of ischemic stroke patients arrive by car, targeted 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

Joshua Lampe, Karen Moodie, Jeffrey Gould, Christopher Kaufman, Norman Paradise, Feinberg School of Medicine Research Category of Submission: 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 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 piston type CPR. Hypothesis: 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 (3–5 kg) with standard physiolog-ical monitoring. Blood flow was measured by Doppler in the right common carotid artery. Ventricular fibrillation artificially induced. CC were started after 5 minutes of untreated VF. CC were delivered at a rate of 120 (50 compressions/minute) and a duty cycle of 45% or 27% for each rate, and at a depth of 2 inches for a total of 6 minutes after 2 min-utes of “break-in” CPR (increased depth from 1 inch to 2 inches) rate or duty cycle were
changed every 1.5 minutes. Results: At a rate of 125 CPR, CC delivered at a duty cycle of 45% generated roughly twice the carotid blood flow in mm·Hg·s/L·min delivered at a duty cycle of 27% (0.157 ± 0.086 L/min vs. 0.075 ± 0.04 L/min, respectively). However at a rate of 50 CPR, blood flow became dependent on duty cycle (45%: 0.045 ± 0.015, 27%: 0.037 ± 0.015). This relationship appeared to be conserved when blood flow was measured at the level of the carotid bifurcation.

Conclusions: The results of these experiments suggest that carotid blood flow is dependent on CPR rate and duty cycle. These data suggest that the dependence of CC generated blood flow on intra-compression pause time cannot be assigned to either the change in rate or duty cycle, but is a combination of both effects. These data highlight possible mechanistic differences between piston and vest CPR.

77. REARREST IN THE POST-ROSC PERIOD ASSESSED WITH POST-SHOCK RESUSCITATION FAILURE: RATIOS OF POST-ROSC VS. REARREST METHODS

Amber Rice, Joshua Gaither, Daniel Spait, Vatsal Chikani, Sean Wentworth, Tyler Vonderharr, Taylor George, Terry Mullins, Bentley Bobrow, University of Arizona CATEGORY OF SUBMISSION: Cardiac

Background: Limited out-of-hospital cardiac arrest (OHCA) studies have found that rearrest after return of spontaneous circulation (ROSC) is both common and independently associated with lower survival. To better understand prehospital rearrest after ROSC, we sought to determine the frequency of cardiac rhythms for adults with OHCA of presumed cardiac etiology in an expanded and more recent sample of OHCA.

Methods: Patients were identified from September 2008 to December 2013 from three EMS systems in Arizona. Minute-by-minute post-ROSC and rearrest rhythms were grouped into Utstein categories by two emergency medicine trained physicians after analysis of continuous defibrillator ECG data (E Series, ZOLL Medical). Rearrest rhythms in this sample were pulseless VT/VF (45%) sustained at least one minute, or pulseless electrical activity (62.3%) and VT/VF (32.6%).

Results: Of 3,083 OHCA, 6,339 (7.9%) patients were instructed DA-CPR between 2013 and 2015. A Total of 6,383 (7.7%) patients were enrolled, 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, longer 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 at discharge [Middle vs Early AOR (95% CI): 0.81 (0.63–1.04), Late vs Early AOR (95% CI): 0.79 (0.60–0.93), Late vs Middle AOR (95% CI): 0.98 (0.76–1.26)].

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

79. IMPACT OF REAL TIME CHEST COMPRESSION FeEDBACK INCREASES WITH APPLICATION OF THE 2015 GUIDELINES

Kenan Kunstal, Tiffany Hoyne, Sara Watlenbarger, Stacie Mccalley, Laurel Linder, Daniel Davis, ZOLL Medical CATEGORY OF SUBMISSION: Cardiac

Background: Cardiac arrest survival is dependent upon chest compression quality. Target parameters, including compression depth and rate became more specific from the 2010 Guidelines [2 ± inches, 80–120/min] to the 2015 Guidelines [2 ± inches, 100–120/min]. Real-time audiovisual feedback (RTAVF) may improve compression guideline adherence, but the impact of RTAVF application of more specific targets is unknown. Hypothesis: Dependence on RTAVF to achieve compression guideline adherence will increase with application of the specific 2015 Guidelines.

Methods: Data were collected as part of a benchmarking program conducted at multiple U.S. hospitals. Compression rate and depth were recorded using standard compression mannequins and RTAVF defibrillators (R Series, ZOLL Medical). The program included subjects enrolled before and after the 2015 Guidelines (n = 995) introduction of the 2015 Guidelines, with target compression parameters modified accordingly. At baseline subjects were instructed to perform 2 min of continuous compressions with RTAVF feedback disabled. After a brief RTAVF orientation, subjects repeated 2 min of continuous compressions with feedback enabled. The 2010 Guidelines cohort and 2015 Guidelines cohort were compared with regard to the percentage of compressions meeting appropriate rate/depth targets with and without use of RTAVF. Results: An increase in compression guideline adherence was observed with use of RTAVF for both the 2010 Guidelines cohort [60.3% to 96.0%, OR 15.9 (10.8–25.6), p < 0.001] and the 2015 Guidelines cohort [60.7% to 95.0%, OR 94.4 (67.9–131.2), p < 0.001]. The proportion of subjects requiring RTAVF to achieve guideline adherence increased from the 2010 Guidelines cohort to the 2015 Guidelines cohort [36.1% vs. 79.3%, OR 6.8 (5.5–8.4, p < 0.001)].

Conclusions: The use of RTAVF increases adherence to chest compression guidelines, particularly with application of the narrower 2015 Guidelines targets for compression rate and depth.

80. DIRECT TRANSFER TO COMPREHENSIVE STROKE CENTER MAY NOT EXPEDITE REPERFUSION OF LARGE VESSEL OCCLUSION STROKE

Ali Shams, Chris Kanaan, Rebbecca Gryszewicz, Chris Kazmierczak, Laura Steucher, Robert Swor, Beaumont Health CATEGORY OF SUBMISSION: Student, Resident, Fellow

Background: A body of knowledge has evolved that has demonstrated improved functional outcome from LVO strokes with timely mechanical endovascular therapy. To decrease time to care, EMS protocols have been developed. The caregiver (treatment) time intervals from arrival at either first hospital or CSC to interventional skin puncture (access) and reperfusion at the CSC were recorded. Transfer distance was calculated using Google Maps. Because we sought to assess impact of triage within a regional EMS system, we included patients transferred within a 1-hour travel time to the regional hospital. Non parametric statistics were used for comparisons. Median and range are reported.

Results: We had a total of 62 cases from 15 CSC, with 54 transported within 15 miles. Of these, 25 patients were direct transports (15 via EMS and 10 via private car) and 29 were patients transferred within a 15-mile radius. Transfer to interventional skin puncture (access) and reperfusion at the CSC occurred. Transfer time was not dependent on duty cycle[0.157 ± 0.064] or became nonadherent [0.4% vs. 1.0%, OR 2.6 (0.7–9.3), p = 0.63] or became nonadherent [0.4% vs. 1.0%, OR 2.6 (0.7–9.3), p = 0.16] with RTAVF Conclusions: The use of RTAVF increases adherence to chest compression guidelines, particularly with application of the narrower 2015 Guidelines targets for compression rate and depth.
Background: Early defibrillation of shockable cardiac arrests, aspirin and 12 lead ECG, and a combination of nitroglycerin and non-invasive positive pressure ventilation (NIPPV) in acute decompen-sated heart failure has been shown to provide meaningful clinical benefit. There has not yet been much work done 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 9-41 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 arrests, the proportion of these arrests within 5 minutes, the proportion of patients over 35 with non-traumatic chest pain who received both aspirin and a 12 lead ECG, and the proportion of patients with acute decompen-sated heart failure (ADHF) as defined by SBP > 200 and either a RR ≥ 130 or SpO2 ≤ 90 who received both NTG and NIPPV. For times, we provide the average, median and interquartile range. For proportions, we also cal-culated the 95% confidence interval. Results: Of 11,144 cardiac arrests with an initial shockable rhythm, 1,630 (14.6%) were de-fibrillated within 5 minutes. The average time to first shock was 13.65 min, IQR 9.06 (13.2). There were 533,127 patients over 35 with non-traumatic chest pain. Of these, 109,123 (4.4%) (37.2–37.5%) received both aspirin and a 12 lead ECG. There were 2,612 patients with ADHF 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 bun-dle 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 Cash, Remle Crowe, Jeremy Miller, Ashish Panchal, The National Registry of Emergency Medical Technicians Category of Submission: Operations, Quality, Safety Systems, Disaster, Disaster Conclusions: Advanced emergency medical technician (AEMT) certification, the provider level below the 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 explored, little is known regarding the AEMT level. Our objective was to examine the association of pre- and postgraduate characteristics and success on the National AEMT Cognitive Examination. 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 analysis of all first-attempt National AEMT Certification cognitive examination results from October 2016 to April 2017. Upon completion of the 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%(C)). 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, 56% (n = 1323) 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 (1.37, 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). However, respondents who were required by their program to complete a final course-ending cognitive examination had increased odds of success compared to those who did not (2.18, 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 examination experiences were significantly associated with increased odds of success on the National AEMT Examination. Future work should examine the impact of program entry requirements and program curriculum composition on graduate performance.

83. CHANGE IN QUANTITATIVE VENTRICULAR FIBRILLATION (QVF) OUTPUTS OF CHEST COMPRESSIONS IN CPR

Matthew Sundermann, Salvatore Saldico, James Menegazzi, Department of Emergency Medicine, University of Pittsburgh 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 their performance characteristics. Quantitative ECG (QECG) features of the ventricular fibrillation (VF) waveform correlate with myocardial perfusion levels during cardiac arrest and therefore may be a good quality metric. We hypothesized that there would be an association between characteristics of QECG and CC characteristics. Methods: CC process and associated continuous prehospital ECG data were received and downloaded from defib-rillator downloads obtained from the continu-ous chest compression (CC) triad of the Resusci-ation Outcomes Consortium (ROC). Cases were included if there was one defibril-lator file with a bout of CC bounded by ana-lyzable ECG signal segments, and amounted to 25,210 cardiac arrests, 10,921 unique cases. For each bout, the QECG meas-ures AMSA, MS, LAC, and DFA were calcu-lated for the starting and ending ECG segments around the bout, and CPR performance met-rics were calculated for the intervening bout of CC. CC process metrics included: duty cycle, fraction, bout duration, dose rate, dose depth, and dosed duty cycle. We then analyzed the relationship between QECG and QECG by regressing the change in QECG measures from the start each bout to the end of each bout against the QECG measures for that bout in multivariable models includ-ing bout duration and patient characteristics. Results: CC duration was associated with change in QECG value and was significant for change in MS (β = 2.13, coefficient 8.92, p = .033). All other associations between chest compression parameters and QECG 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.
Background: The use of push dose epinephrine (PDE) is becoming increasingly common in the management of hypotension in the prehospital setting. However, no quantitative research has been done to analyze the patient populations receiving this treatment. We aim to describe the population of patients treated with PDE as compared to hypotensive patients not treated with PDE. Methods: We performed a retrospective cohort study to describe the use of PDE in a critical care transport system. We evaluate the use of PDE for management of prehospital hypotension from January 2015 to April 2017. We reviewed prehospital and in-hospital medical records for patients treated and transported by a multi-state air medical service that incorporated PDE into its protocols (epinephrine 100 mcg IV/IO every 2 minutes as needed for hypotension). Patients were selected if they were hypotensive and met inclusion criteria for PDE use in the current protocol. We compared pretreatment characteristics and vital signs for patients following an index event (SBP < 70). We utilized non-parametric (rank sum tests) and chi-square to identify significant differences between the cohorts. Results: 1862 eligible (SBP < 70) cases were identified, PDE was administered to 23%, Cases vs. controls differed by age, PDE median age 65 (IQR 55–76) vs. No PDE 61 (IQR 50–72), but not gender or race. Patients receiving PDE were more likely to be intubated (PDE 32.4%, No PDE 14.3%, Pr0.00) and vasopressor dependent (PDE 32.8%, No PDE 15.5% Pr0.00) prior to flight crew arrival. Patients also differed with respect to Lactate level (PDE 8.2 (IQR 4.5,9) vs. No PDE 3.7 (IQR 2.3) and pre-treatment crystalloid (PDE 1000 IQR 500,2600) vs. No PDE 1000 IQR 200,2000). Other pretreatment variables (HR, SpO2, RR) did not differ. Conclusions: Prehospital administration of PDE in our system is administered in only a fraction of patients meeting protocol criteria. PDE administration is associated with intubation, vasopressor use, increased lactate, and mortality compared to patients not receiving PDE possibly indicating a selection or indication bias.

86. Adherence to Recommendations for Prehospital Cardiac Arrest Care Across an EMS System of Care: How Well Are We Implementing Guidelines?

Jonathan Kamrud, Lori Boland, Andrew Stevens, Jessica Jeruzal, Charles Lick, Allina Health Emergency Medical Services Category of Submission: Cardiac

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, we analyzed care rendered by bystanders, dispatchers, first responders (FR), and emergency medical services (EMS) personnel. 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 non-traumatic arrest, and had complete data available for bystander, dispatcher, first responder, and EMS care elements. Baseline characteristics (AI; range score 6) was calculated based on successful delivery of six care elements aligned with AHA recommendations: dispatcher provided instructions for CPR when possible, bystander or FR initiated chest compressions (pre-ambulance CPR), bystander or FR placed an AED (pre-ambulance AED), compression fraction during EMS CPR > 80%, compression rate during EMS CPR of 100-120/minute, 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 sources included audio recordings of dispatch calls, the Cardiac Arrest Registry to Enhance Survival (CARES) registry data, and transcriber interpreted data. 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% >10 sec >3 = 81%. Care was delivered in accordance with all six criteria (AI = 6) in 52% of events (n = 153) and the highest AI was 8.5 in 22% of events (n = 228). The number of events with AI ≥ 5 increased from 70% among 2014 cases to 83% among 2015 cases (p = 0.001) for interventions that were considered for EMS CPR criteria. Conclusions: We present our experience in measuring adherence to the guidelines for optimal prehospital OHCA management that were studied is very high in this high 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 During Emergency Calls by Community Level: Public Awareness of Cardiac Arrest: Recognition: A Multi-Level Analysis

Sun Young Lee, Young Sun Ro, Sang Do Shin, Kyung Jun Song, Ki Jeong Hong, Soyeon Kong, Kyoung Jun Song, Ki Jeong Hong, Young Sun Ro, Soyeon Kong, Young Sun Ro, Soyeon Kong, Ki Jeong Hong, Young Sun Ro, Soyeon Kong.

Background: Bystander cardiopulmonary resuscitation (CPR) is a key factor to improve survival outcomes after out-of-hospital cardiac arrest (OHCA) patients. A text message (TM) alert system for trained citizens was implemented to increase bystander CPR in the community. This study aimed to determine the effects of the TM alert system on bystander CPR rate and survival outcomes after OHCA. Methods: A before-after population based study was conducted with resuscitation attempted OHCAs between 2014 and 2015 in the study districts of Seoul, South Korea. Seoul implemented a TM-alert system as a community intervention in May, 2015. The intervention group was defined as those cases that occurred from May to December in 2015, and the historical control group was defined from the same period (May to December) in 2014. Endpoints were bystander CPR rate and survival to discharge. Multivariable logistic regression analysis was used to evaluate the effect of TM alert intervention compared with historical control group. Results: A total of 1,124 OHCAs were analyzed, with 560 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 (21.3%) in 2015 (p-value = 0.14). Survival to discharge was observed in 31 patients (5.3%) in 2014 and 56 patients (10.0%) in 2015 (p-value = 0.04). The odds ratios (95% CI) of bystander CPR 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.

88. Comparison of Manual vs. Mechanical Chest Compression Quality During Prehospital Cardiac Resuscitation

Joshua Gaither, Amber Rice, Chengchong Hu, Robyn McDannold, Margaret Mullins, Daniel Spade, Tyler Vadeboncoeur, Terry Mullins, Bentley Bobrow, University of Arizona Category of Submission: Cardiac

Background: Cardiopulmonary resuscitation (CPR) quality is strongly linked to outcomes following out-of-hospital cardiac arrest (OHCA). Manual CPR quality varies and has risk to providers. We hypothesized that use of a mechanical CPR devicer could provide high-quality CPR than manual CPR during technically challenging periods of OHCA resuscitation, including the packaging, loading, and transporting of patients. Methods: Cases of
Background: Young children and adolescents are frequently injured in peacetime and wartime. Reviews of trauma care at U.S. military medical facilities during the Iraq and Afghanistan conflicts show as the age of a child a child decreases the injury severity and mortal- ity increases. Tourniquet use for the control of extremity hemorrhage in adult trauma patients is associated with increased survival with only minimal tourniquet associated morbidity. Use of commercial tourniquets on pediatric patients treated at US military facilities shows survival benefits similar to those seen in the adult population. Hypothesis: We hypothesized that there would be differences in the efficacy 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 the two commercial tourniquets on a pediatric arm hemorrhage test model using six sized mannequins to simulate pediatric arms. The Stretch Wrap And Tuck (SWAT), TaMed K9 (TMK), and Rapid Application Tourniquet System (RATS) tourniquets applied by rescue forces by the elastic recoil action of the tourniquet strap. The Combat Application Tourniquet (CAT), Sam XT (SAM), Medical Tourniquet (TMT), and the SOF Tactical Tourniquet – Wide (SOFTTW) use a windlass to increase circumferential compression by decreasing strap length. The Child Ratcheting Medical Tourniquet (CRMT) uses a ratchet and ladder mechanism for circumferential compression. The Mechanical Advantage Tourniquet (MAT) has a turnkey apparatus mounted on a fixed length C-shaped housing that pulls a portion of the retaining strap into the housing as a mechanism to increase circumferential pressure. Results: The SWAT, TMK9 and RATS were successful stopping the flow of water on all sized mannequins. The CRMT was the only mechanical advantage tourniquet that was success- ful in stopping fluid flow on all mannequin sizes. The TMT and SOFTTW failed on the mannequins with 6.35 cm diameters. The CAT, SAMXT, TMT, and SOFTTW all failed on the 7.62 cm diameter. The MAT failed on the 7.62 and smaller diameter mannequin.

Conclusions: We have shown that many com- mercially available tourniquets fail on the 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 Helphenbein, Bruce Barnhart, Saeed Babarazadeh, Dawn Jorgenson, Chengcheng Hu, Vatsal Chikani, Joshua Gaither, Samuel Keim, Duane Sherrill, Daniel Spattle, 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 ages. It is remarkably common for patients with 90 mmHg) to traumatic brain injury (TBI). Furthermore, in TBI research, case ascertainment and risk-adjustment are highly dependent upon documentation of prehospital BP. Objective: To identify the concordance between the lowest SBP documented on the medical record in patient care records (PCR) and the recorded non-invasive monitor data in TBI.

Methods: A subset of major TBI cases (moder- ate/severe; CDC Barell Matrix 1) in the EPIC EMS TBI Study (NIH 1R01NS071049) were
evaluated (3/13–3/17). Cases from 6 EMS agencies that report continuous monitor data (Philips MRxTM as part of EPIC were included. A record was only included if the post-assessment was displayed and accessible to the providers during EMS care. We compared the lowest yet documented SBP to the monitor recorded value in each patient. Results: 132 cases were included (median age: 52, 65% male). In 96 cases (72.7%), the lowest PCR documented 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-defined hypotension identified by the monitor (<90 mmHg), only 11 (68.8%) were documented in the PCR.

Conclusions: Significant disparities were identified between the lowest monitor-recorded SBP and the PCR-documented value. Furthermore, PCRs failed to identify one third of monitor-documented hypotension. This may be explained, in part, by ongoing care responsibilities and scene distractions that may cause providers to miss BP readings. Our findings identify a potential hidden contributor to poor outcome if hypotension goes unrecognized, and untreated, rather than simply not being documented. Furthermore, case ascertainment, concordance, and the adjustment in the denominator variables may be substantially impacted. Whenever possible, quality improvement and research projects that target individual EMS agencies may be best management partnership in the patient’s home. The objective of this study was to evaluate the effectiveness of a fire-based community paramedic (CP) program on CHF management in patients recently discharged from the hospital using the Minnesota Living with Heart Failure questionnaire (MLHF). We hypothesized that CP visits will contribute to improvement in the patient’s quality of life as assessed by the MLHF. Methods: Patients with a CHF diagnosis who were hospitalized who provided consent to participate in the CP program completed the MLHF prior to discharge. 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 (QOL). Total MLHF scores range from 0-105. 4-6 weeks after discharge, patients repeated the MLHF. Pre/post survey scores were analyzed descriptively using means and standard deviations. Scores were assessed with Wilcoxon signed-rank tests in three dimensions: total score, emotional limitations, and physical symptoms. Results: Twenty-three patients completed the pre- and post-tests from March 2015 to May 2017. The mean total scores on the pre-assessment (score = 57.83, SD = 28.09) and post-assessment (score = 45.30, SD = 30.77) were significantly different (p = 0.022). Mean pre-score for physical assessment questions was 25.78 (SD = 12.06) while on the post assessment it was 21.22 (SD = 11.66). Mean of the emotional score on the pre-assessment was 12.17 (SD = 8.55) while on the post assessment it was 9.96 (SD = 6.84). Total scores were significantly different between the pre and post assessments (p = 0.0216). Scores for the physical questions of the assessment were significantly different between the pre and post assessments (p = 0.0218). The pre-post difference in emotional score was not different (p = 0.21). Conclusions: Using the MLHF, we find significant improvement in QOL of CHF patients who completed the CP program. This study is limited by the small sample size but demonstrates encouraging improvement in post 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 Panchal, Douglas Kupas, National Registry of Emergency Medical Technicians Category: Submission: Operations, Quality, Safety Systems, Disaster, Disaster

Background: Recent crash testing shows EMS professionals are at high risk of injury or death while riding unrestrained in an ambulance, yet seatbelt use is reportedly low. Variation in seatbelt use based on seating location and patient acuity is unknown. Our objectives were to describe the prevalence of seatbelt use by seat location and identify factors associated with belt practices. We hypothesized that seatbelt use would be low in the patient compartment regardless of presence of a patient, seating position, or patient acuity. Methods: We analyzed a cross-sectional electronic questionnaire administered to a random sample of nationally-certified EMS professionals. Respondents reported frequency of seatbelt usage in the prior 12 months. Inclusion criteria consisted of practicing EMS or higher in non-military settings who work in ambulances. We defined consistent seatbelt use as reporting frequency of use >50% of the time in a seating location. The seatbelt use data was compared using a logistic regression analysis. Results: A total of 1,431 responses met inclusion criteria (response rate = 11.4%). Most respondents wore a seatbelt while driving the ambulance (97%, n = 1,381/1,421). In the patient compartment without a patient being transported, consistent seatbelt use was poor regardless of seat position (forward-facing seat: 60% [n = 49/82], rear-facing airway/jump seat: 59% [n = 670/1,136], crew bench: 36% [n = 362/997]). During patient transport, consistent seatbelt use on the crew bench was reported at 23% with stable patients and 11% with critical patients. Factors associated with increased odds of seatbelt use on the crew bench when transporting a critical patient (lowest seatbelt use) included having a company policy for seatbelt use (1st and 2nd in the EMS provider level (2,391,52-378 [reference: AEMT/Paramedic]), controlling for years of experience. Conclusions: Seatbelt use by EMS personnel in the patient compartment was low and varied by seat and patient acuity, with use highest in a forward-facing seat. We found lowest was in the patient compartment during the potentially more hazardous transport of critical patients. Future work should examine ways to increase seatbelt use in the patient compartment.

97. FEASIBILITY OF MANUAL ACTIVE COMPRESSION DECOMPRESSION CPR IN A THIRTY-DEGREE HEAD UP POSITION Heather Ellis, David Chase, Ventura City Fire Department Category: Submission: Burn/Critical Care

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. Decompression 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. Hypothesis: High quality 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, Edward Kasim, Ashish Panchal, Paula Miller, Ann Majerus, Aaron Burnet, Matthew Simpson, Sandi Wewerka, Joseph Pasquarella, Ann Leben, Madison Rivard, Anne Knorr, Ashish Panchal, Douglas Kupas, National Registry of Emergency Medical Technicians Category: Submission: Operations, Quality, Safety Systems, Disaster, Disaster

Conclusions: While statistically significant (p = 0.003), the overall increase was less than one percentage point (21.4% in 2007 to 22.1% in 2016). A change of less than 2% was noted in 8 of 9 years. The percentage of females earning initial National EMS Certification increased from 28.7% in 2007, representing a percent change of 21.3% in 2016, representing a percent change of 21.4% in 2007 to 22.1% in 2016. The Ohio State University Wexner Medical Center Category: Submission: Operations, Quality, Safety Systems, Disaster, Disaster

Methods: Recent crash testing shows EMS professionals are at high risk of injury or death while riding unrestrained in an ambulance, yet seatbelt use is reportedly low. Variation in seatbelt use based on seating location and patient acuity is unknown. Our objectives were to describe the prevalence of seatbelt use by seat location and identify factors associated with belt practices. We hypothesized that seatbelt use would be low in the patient compartment regardless of presence of a patient, seating position, or patient acuity. Results: A total of 1,431 responses met inclusion criteria (response rate = 11.4%). Most respondents wore a seatbelt while driving the ambulance (97%, n = 1,381/1,421). In the patient compartment without a patient being transported, consistent seatbelt use was poor regardless of seat position (forward-facing seat: 60% [n = 49/82], rear-facing airway/jump seat: 59% [n = 670/1,136], crew bench: 36% [n = 362/997]). During patient transport, consistent seatbelt use on the crew bench was reported at 23% with stable patients and 11% with critical patients. Factors associated with increased odds of seatbelt use on the crew bench when transporting a critical patient (lowest seatbelt use) included having a company policy for seatbelt use (1st and 2nd in the EMS provider level (2,391,52-378 [reference: AEMT/Paramedic]), controlling for years of experience. Conclusions: Seatbelt use by EMS personnel in the patient compartment was low and varied by seat and patient acuity, with use highest in a forward-facing seat. We found lowest was in the patient compartment during the potentially more hazardous transport of critical patients. Future work should examine ways to increase seatbelt use in the patient compartment.
system continuous ACD CPR was started by a three-member first response team. The com-
pressor straddled the mannequin. After each 200 compressions, there was a break to switch compressors. The CPR feedback from the mannequin and the ResQCPRTM system was recorded and analyzed looking at depth, rate, and decompensation negative pressure (>10 kg). 80% beat-to-beat compliance for depth and decompression and an average rate between 75 and 85/minute was considered high quality CPR. Zoll recommends a rate of 80/minute for this system. After completion of 15-20 minutes of simulated manual 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.

98. TELEVISION AND FILM DEPICT UNREALISTIC RATES OF CARDIAC ARREST SURVIVAL
Johanna Innes, Brian Clemency, Maxwell Did-
dams, Peter Natalizia, Deborah Waldrop. Uni-
versity 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 television and film. We hypothesize that the survival rates portrayed on television in movies were significantly higher than actual cardiac arrest survival rates.

Methods: We conducted a systematic review of existing studies of cardiac arrest resuscitations depicted on television and film. A PubMed search was conducted using the following search terms: “card-
diopulmonary resuscitation and television,” or “resuscitation and television,” or “heart arrest and television.” Two reviewers independently reviewed all studies. Studies that included survival data from in hospital and out of hospital cardiac arrest patients depicted on television or in movies were included in the analysis. Subject demographics, rates of return of spontaneous circulation (ROSC), and survival to discharge were reviewed and compared to published data from the Cardiac Arrest Registry to Enhance Survival (CARES) registry.

Results: The initial PubMed search yielded 260 unique references. There were 412 resuscitation attempts among 532 cardiac arrests, from 8 studies which met the inclusion criteria. The most common cause of cardiac arrest was trauma (46.2%). All studies had data on ROSC, which occurred in 203 cases. The proportion of ROSC among the studies was 49% (range 19%–79%). The average rate of ROSC among the studies was 91.4% (1.1%; 88.0–94.8%). 10 of 10 survey respondents described high quality CPR, although with limited evidence of clinical effi-
cacy. There is a growing body of evidence of the dangers of CPR and the effec-
tiveness 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 9-1-1 services. We sought to describe the proportion of RLS responses using a large national dataset. Methods: Using data from 6,127/2 years of data from 4-1-1 consented agencies using ESO’s Electro-

Health Record (EHR) system, we identi-

fied 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, 5,840,058 (75.9%, 75.8–75.9%) involved RLS response to the scene and 1,494,578 (19.4%, 19.4–19.4%) resulted in RLS response from the scene to the hospital.

Conclusions: Using a large national dataset, we provided baseline information on the preva-
lence of the use of RLS to and from 9-1-1 calls. While we are unable to assess the necessity of such response, given the known prevalence of high-accuracy 9-1-1 calls, it is possible that the 70% of RLS responses to 9-1-1 scenes could safely be decreased with appropriate priority dispatch processes and ongoing quality improvement. Further analysis of the data should assess the necessity of RLS response from the scene.

100. USEFULNESS OF EPIPHENINE IN CARDIAC ARREST
James Hehl, Matthew Wells, Beth Langley, JE Winslow, The Penn 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 resuc-
tiation and early defibrillation is receiving more emphasis. For decades, intravenous (IV) admin-
istration of epinephrine every 3–5 minutes has been a component of the standardized proto-

col for treatment of cardiac arrest, yet recent studies suggest that frequency of administra-
tion could improve neurological recovery. There-
fore, our EMS agency developed a “one dose epinephrine” prehospital protocol for medi-
cal cardiac arrest patients. The most common cause of cardiac arrest was trauma (46.2%). All studies had data on ROSC, which occurred in 203 cases. The proportion of ROSC among the studies was 49% (range 19%–79%). The average rate of ROSC among the studies was 91.4% (1.1%; 88.0–94.8%). 10 of 10 survey respondents described high quality CPR, although with limited evidence of clinical effi-
cacy. There is a growing body of evidence of the dangers of CPR and the effec-
tiveness 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 9-1-1 scenes. We sought to describe the proportion of RLS responses using a large national dataset. Methods: Using data from 6,127/2 years of data from 4-1-1 consented agencies using ESO’s Electroni-

Health Record (EHR) system, we identi-

fied 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, 5,840,058 (75.9%, 75.8–75.9%) involved RLS response to the scene and 1,494,578 (19.4%, 19.4–19.4%) resulted in RLS response from the scene to the hospital.

Conclusions: Using a large national dataset, we provided baseline information on the preva-
lence of the use of RLS to and from 9-1-1 calls. While we are unable to assess the necessity of such response, given the known prevalence of high-accuracy 9-1-1 calls, it is possible that the 70% of RLS responses to 9-1-1 scenes could safely be decreased with appropriate priority dispatch processes and ongoing quality improvement. Further analysis of the data should assess the necessity of RLS response from the scene.

101. ASSOCIATION BETWEEN INITIAL BLOOD GLUCOSE IN OUT-OF-HOSPITAL CARDIAC ARREST AND RETURN OF spontaneous circula-
Caitlin Howard, Hattie McAvinney, David Wampler, Jeremy Allen, Justin Smith, David Miramontes, Joan Polk, United States Army, UTHSCSA 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 return of spontaneous circula-

tion (ROSC). Methods: This was a retrospective review of a registry of all patients who had each resuscitation attempt by an urban, urban fire-based EMS system where the prevalence of diabetes is 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 (ROSC vs. No ROSC). Patients were excluded if age < 17, no age, 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. A t-test was used to analyze continuous variables and a χ2 test was used to analyze categorical variables.

Results: 620 patients were included in this study. Mean age was 64.23 ± 17.20 years with 385 males (62.10%), 433 patients (73.06%) had an initial blood glucose > 200, and 39 patients (6.94%) had a glucose level > 200. Of the patients with glucose > 200, 171 (37.75%) obtained ROSC. Of those with glucose < 200, 63 (27.72%) 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. The main
limitation to this study was that the patient population was restricted to San Antonio, Texas. Additionally, we only considered the initial blood glucose obtained during the resuscitation.

102. IMPLEMENTING A PREHOSPITAL PROTOCOL TO TREAT BEHAVIORAL EMERGENCIES WITH MIDAZOLAM LEADS TO EFFECTIVE CONTROL OF AGITATION

Christopher Richards, Ryan Huebinger, Katie Tatari, Joseph Weber, Kenneth Pearlman, Eddie Markul, Matthew Strzalka, Mark Kiely, Leslee Shipp-Spencer, Leslie Zen, Northwestern Feinberg SOM Department of Emergency Medicine and Center for Healthcare Studies, Chicago EMS System Category of Submission: Medical

Background: Combative patients are commonly encountered by EMS providers and pose challenges for both patient care and provider safety. Chemical sedation with midazolam is commonly used in the emergency department setting to treat agitation from psychiatric or traumatic origins. However, limited data exist regarding midazolam use in the prehospital setting to treat agitation. We sought to describe our experience after implementing a protocol for treating patients with behavioral emergencies using midazolam in a large urban EMS system. Hypothesis: We hypothesized that implementation of a prehospital protocol using midazolam to treat patients having a behavioral emergency leads to improved clinical conditions without causing significant clinical deterioration. Methods: We performed a retrospective review of EMS records following the implementation of a behavioral emergencies protocol in a large urban EMS system from February 2014 through April 2016. Paramedics were instructed to administer midazolam 1 mg intravenous (IV) or intranasal (IN) or 5 mg intranasal (IN) to treat patients having a behavioral emergency. We analyzed the rates of ROSC during resuscitation and at hospital arrival. Analysis of variance was done using t-tests. Results: In medical OHCA, incidence of ROSC during resuscitation increased from 41% (185/452) to 46% (220/482) with implementation of the TOR checklist and ROSC at hospital arrival increased from 35% (160/452) to 40% (191/482). There was also a significant (p < 0.001) trend toward increased duration of resuscitations (26 to 30 minutes) and duration of OLMC (13 to 15 minutes) after the checklist was implemented in cases of medical OHCA. Conclusions: In medical OHCA the use of a TOR checklist by OLMC significantly increased the duration of both resuscitations and OLMC time. The rates of ROSC during resuscitation and at hospital arrival increased after the checklist was implemented for medical OHCA. These results show a potential clinical benefit for OLMC use of a TOR checklist for medical OHCA, and also inform resource utilization in an academic Emergency Department. In traumatic OHCA there were no significant changes in duration of resuscitation or ROSC and there was a decrease in ROSC; further study with a larger sample size may be needed. Neurological outcomes are unknown and further research may provide a better understanding of the impact of these findings.

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

Hunter Lau, Matthew Hollander, Jeremy Cushman, Rebecca Riebold, Lisa Hunt, Courtney Jones, Michael Lohmeler, Manish Shah, University of Wisconsin School of Medicine and Public Health Category of Submission: Student, Resident, Fellow

Background: The Care Transitions 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 aim of this study is to evaluate an expert-packaged training program for community paramedics serving as CTI coaches who support the ED-to-home transition. Methods: This study evaluated an ongoing two-center randomized controlled trial evaluating a community paramedic-implemented CTI to enhance the ED-to-home transition. Community paramedics administered multiple domains including the CTI program, geriatrics, motivational interviewing, ED discharge, and community transitions. For one year after starting the study, we conducted audio-recorded semi-structured interviews with community paramedics in both cities (June–July 2017). After transcribing the interviews verbatim, team members independently performed preliminary coding. Ensuring coding consistency, the results sessions led to the development of final codes and thematic generalizations recurrent in the interviews. Results: All eight participating community paramedics were interviewed. Of the paramedics, five were women and all were non-Hispanic white with a mean age of 43. Participants typically had extensive backgrounds in healthcare, primarily as EMS providers, but minimal experience with community paramedicine. All reported some prior geriatrics training. Four themes emerged 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. Conclusions: Paramedics represent a crucial and largely untapped resource for supporting ED-to-home care transitions, such as through the CTI. Training that leads to the appropriate knowledge, skills, and attitudes is critical for effective implementation, including choosing the optimal candidate population for paramedic training in the most effective manner for the students, and delivering content targeted to student needs.

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

Matthew Szatkynker, Aaron Klassen, Morgan Marshall, Mengtao Dia, N Clay Mann, Mayo Clinic Department of Family 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 interventions to mass shooting and active shooter incidents. Methods: Retrospective analysis of 2014 and 2015 National Emergency Medical Services Information System (NEMSIS) data sets. Data, time, and location for mass shooting and active shooter incidents were obtained from Emergency Medical Services Information System (NEMSIS) data and the National Incident Management System (NIMS) 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 1.2 ± 2.2. NEMSIS data identified 652 EMS activations 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 complaint was reported as not known or unknown problem/man down in 14.6% of all incidents. Predominant response configuration was ALS (78.8%). Volunteer services responded to 7% of events. Most common reasons for dispatch were violent incidents; and all were non-Hispanic white with a mean age of 43. Participants typically had extensive backgrounds in healthcare, primarily as EMS providers, but minimal experience with community paramedicine. All reported some prior geriatrics training. Four themes emerged 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.
Despite the fact that extremity wounds were the most common injury noted, suggesting a role for public access bleeding control, doc- umented EMS tourniquet use was uncommon. While mass shooting events pose high risk for responders, dispatch information was lacking. Nearly 15% of records, dispatching 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. Hep- stey 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 stu- dies in the US to assess the prevalence of such transports or to determine what policies flight pro- grams have in place to address this challenging scenario. We sought to assess the prevalence of operational K9 transports as well as existence and content of protocols to con- duct such transports should one be deemed necessary. Methods: We distributed a survey to air medical programs in the United States via the Research Electronic Data Capture (REDCap) program. Programs were identified using the Atlas and Database 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 trans- ports, policies and procedures was emailed to 285 identified programs. Results: We received 147 total survey responses (49.8% response). Twenty-two programs (15%) reported receiv- ing a request to transport a K9 and of those, 15 reported flying the K9. Forty-one K9 trans- ports were reported. Smaller numbers of pro- grams reported having any additional train- ing 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 having some type of protocol in place for these types of flights. Ninety-five of the programs reported that they would be able to fly the K9 and handler as well as the normal flight crew. Conclusions: The goal of this sur- vey was to assess the number of transports for injured operational K9s and to identify any policies or procedures that programs have in place to carry out a transport if one is requested. Although supposedly a rare occurrence, 15% of our respondents have reported such a request. Of those requests the majority of transports were completed. While some programs may decide that they will not transport an injured operational K9, those programs that will should establish policies and procedures for this type of mission.

107. COMMUNITY PARAMEDIC PARTNERSHIP: SHIFTING HEALTHCARE UTILIZATION THROUGH PARTNERSHIP BETWEEN MUNICIPAL FIRE/EMS AND THE LOCAL LEVEL OF TRAUMA CENTER

Tia Radant, Joseph Pasquarella, Ann Majerus, Matthew Simpson, Paula Miller, Sandi Wewerka, Aaron Burnett, Regions Hospital EMS Category of Submission: OPERATIONS, QUALITY, SAFETY SYSTEMS, DISASTER, DISASTER

Background: A partnership between a Level Trauma Center and an urban, municipal Fire/EMS Department for patients with con- gestive heart failure (CHF) was launched in 2014. The program aimed to improve healthcare utilization and reduce readmissions through a unique Community Paramedic (CP) part- nership. Hypothesis: Patients with congestive heart failure who receive CP visits for 30 days post-discharge have a decreased rate of readmis- sion and an increased use of clinic visits. Methods: Inpatients with CHF were offered visits by a CP for up to 90 days following discharge. Inclusion criteria included, local resident, no home- care services upon discharge, diagnosis of CHF, English speaking, and consent to home visits by a CP. The CP visited the patient in the home 1-2 times per week for 4 weeks following dis- charge. At each visit the CP conducted med- ication reconciliation, a physical exam, home safety evaluation, coordination of follow-up care and referral to community or healthcare resources as needed. Pre/post comparisons were analyzed descriptively using means and standard deviations. Scores were assessed with Wilcoxon signed-rank tests. Results: A total of 64 patients were enrolled between Febru- ary 2015 and July 2017; 32 patients completed the program with complete data. A compari- son of 90-day healthcare utilization pre- and post- admission showed that patients who were provided CP services had a significant decrease in hospital admissions (68%, p = 0.001) and ED visits (62%, p < 0.0001) and had a 14% increase in clinic visits (p = 0.45). A group of patients that did not meet inclusion criteria but desired consent to participate was compared to the patient group that participated in the CP pro- gram. Patients who completed the program had a significantly higher decrease in admissions (p = 0.0145) and ED visits (p = 0.0009) pre- to post-hospitalization than those who did not enroll (n = 20). There was no significant difference in change in clinic utilization. Conclusions: Partnership of fire-based EMS and hospitals for Community Paramedic pro- grams can be successful. CP’s providing post- discharge care results in a shift of healthcare utilization toward reduced admissions/ED vis- its and increased clinic visits. Further research with a larger cohort is needed to determine if utilization patterns would be sustained past 90 days.

108. “PDTREE”: DEVELOPMENT OF A NEW PEDIATRIC PREHOSPITAL TRANSPORT DESTINATION EBG

Jennifer Fishe, Kye Fratta, Jennifer Anders, University of Maryland Department of Emergency Medicine Category of Submission: PEDIATRIC

Background: Prehospital triage should match patient needs with hospital service availabil- ity. EBGs graded EPET in the prehospital setting for adults suffering from trauma, MI, and stroke. However, analogous guidelines do not exist for any pediatric condition save trauma. This study’s objective was to create a non- trauma pediatric prehospital transport des- tination EBG. Methods: A systematic liter- ature search identified articles pertinent to non-trauma pediatric prehospital destination choice. Resulting articles were reviewed using GRADE and compiled into an evidence pro- file. An expert panel (including stakeholders from pediatric EM, EM, EMS medical direc- tors, EMTs concerned for a pediatric family advocate) reviewed the evidence profile and data from the statewide EMS system where the EBG would undergo implementation following a modified- Delphi process with three voting rounds and 75% agreement threshold, the panel selected items for inclusion, refined terminology, and reached consensus on a pediatric prehospital trans- port destination EBG. Results: The literature search produced 60 articles. After GRADE review, 47 articles were included in the evidence profile. Articles identified specific pediatric populations (ALTE, seizures, special health care needs) at risk for secondary trans- port or interfacility transport (IFT). IFT deci- sions are made quickly, but patients risk sub- optimal pre-transfer care which can lead to definitive care and increased morbidity. Quan- titative physiologic data (vital signs, capillary refill time, hospital-based care) may not be isolation do not accurately or reliably pre- dict the need for pediatric specialty/critical care. Combining quantitative and qualitative prehospital assessments promises more accu- rate, reliable prediction of specialty/critical care needs. After reviewing the evidence, the expert panel’s modified-Delphi process pro- duced a pediatric prehospital destination EBG (“PDTree”). The PDTree was formatted as an algorithm, matching 14 non-trauma condi- tions/risk factors (including ALTE, seizure requiring EMS-administered benzodiazepine, sepsis, and emergencies related to conditions treated at a medical home) to three differ- ent levels of pediatric care (specialty, compre- hensive, regional). Conclusions: Existing med- ical literature identifies the need for prehos- pital transport destination guidance for non- trauma pediatric patients. That evidence sup- ported the modified-Delphi process that pro- duced the “PDTree”, a new non-trauma pedia- tric prehospital destination EBG. “PDTree” will be piloted by: computerized resource modeling, prehospital provider simulation, and implementation in three diverse EMS agencies.

109. DUPLICATE PROCEDURES AND CHARGES ASSOCIATED WITH PEDIATRIC PATIENT TRANSFER FROM EMERGENCY DEPARTMENTS

Ali Aledhaim, Jon Mark Hishon, 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 defini- tive care and burdens the patient with poten- tially 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 destina- tion. Objectives: To determine if there are interfacility transport protocols or ED policies that reduce or prevent duplicative procedures and charges sustained by pediatric patients undergoing IFT for inpatient admis- sion. A secondary objective is to determine if an ED visit to an ED adjacent to a pediatric hospital is associated with reduced duplicative procedures and charges. Methods: This study utilized three years (2010-2012) of Maryland HCUP ED and inpatient data. A modified probabilistic algorithm was developed to identify ED patients who were dis- positioned 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 (DX) and whose conditions were classified “emergency” or “urgent”. After linkage, duplicate procedures were identified and classified as administrative or clinical. Mul- tiple regression analysis was used to com- pare the average total charges of IFT patients, including duplicate charges, to non-IFT admit- ted patients presenting with the same top 20 Dx. Results: Of the 9,447 IFT inpatients identi- fied, 2,254 patients were successfully linked, of which 1713 (76%) had one of the top 20 Dx. The most frequent administrative duplicate procedure was ER EMTALA emergency medical screening (1,407). Notable duplicative clinical procedures involving charges were chest X-ray (239) and CT scan of head (97) or body (32). IFT patients incurred an aver- age total charge of $11,786.61 including an aver- age duplicate charge of $3,045.22. The median, the average charge incurred by a non-IFT was $8,209.72. Adjusting for the effect of age, gender, and race, a weighted regression model was reached consensus on a pediatric prehos- pital triage destination EBG. Prehospital transfers promise more accurate, reliable prediction of specialty/critical care needs. After reviewing the evidence, the expert panel’s modified-Delphi process pro- duced a pediatric prehospital destination EBG (“PDTree”). The PDTree was formatted as an algorithm, matching 14 non-trauma condi- tions/risk factors (including ALTE, seizure requiring EMS-administered benzodiazepine, sepsis, and emergencies related to conditions treated at a medical home) to three differ- ent levels of pediatric care (specialty, compre- hensive, regional). Conclusions: Existing med- ical literature identifies the need for prehos- pital transport destination guidance for non- trauma pediatric patients. That evidence sup- ported the modified-Delphi process that pro- duced the “PDTree”, a new non-trauma pedia- tric prehospital destination EBG. “PDTree” will be piloted by: computerized resource modeling, prehospital provider simulation, and implementation in three diverse EMS agencies.
compared to a non-IFT patient. Conclusions: Both safety harms (radiation exposure) and significant economic burden are seen in the subset of cases undergoing this study was challenging for an inpatient admission to a distant facility. EMS systems can minimize this inefficiency and burden by providing access 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 Tanguay, Jean-Michel Paradis, Denise Hébert, Richard Fleet, Département de Médecine d’Urgence – Université Laval

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 transported in ambulance 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 diverted and transported to the nearest PCI-capable center according to an emergency physician interpretation of a 12-lead ECG transmitted by paramedics. Patients with continuous electrocardiography (ECC) and vital signs monitoring during transport. A focus group composed of the authors established clinically important and minor events based on literature search. A multivariate ordinal logistic regression model was used to study the association between transportation time (0-14, 15-29, and ≥30 min) and the occurrence of clinical events. Results: Clinically important and minor events were experienced by 18.6 and 30.1% of STEMI patients, respectively. Transportation time was not associated with higher risk of suffering from clinical events (p = 0.182). The most frequent events were bradycardia (8.87%), followed by hypotension (6.1%), and hypoxemia (7.93%). All patients suffering from VT/VF (5.13%) and the occurrence of clinical events such as bradycardia or hypotension (6.1%) were transient for both adult and pediatric patients. All protocols have been revised within the past 5 years and 78% of protocols were revised since 2015. Conclusions: The prevalence statement on drug-assisted 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 sedative-only intubation despite the NAEMSP 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, Penn 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 fluids to the patient, particularly in cases in which venous access is compromised; however, if done incorrectly, it can lead to unwanted complications such as extravasation of fluid, poor flow, and catheter dislocation. The purpose of this study is to see if EMS providers can adequately locate the correct locations for the placement of IO needles in live models. Methods: We assessed the accuracy of intraosseous needle placement by using 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 in tibial and humeral IO spots, marked so that the needles were lined up with the model via landmarks. The participant was asked to place a sticker directly on the model where they would insert the EZIO at both locations. Afterward, a second sheet with the sticker placed at a location correlating with standard placement was compared against the participant-placed sheet. Differences in placement were measured with a ruler to the nearest half centimeter. Direction was qualitatively noted. Numbers were assigned to each participant so that the demographic survey, location survey, 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 (95% CI: 4.06-6.06). The average from the tibia was 4.13 cm (95% CI: 3.16-5.10). Both were statistically significant with a p value of <0.0001. Conclusions: These results show a low level of agreement among EMS providers in identifying correct landmarks for intraosseous needle placement. This suggests additional training and skill 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


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 treatment of anaphylaxis are needed. The aim of this study was to compare the proportion of cases of anaphylaxis appropriately treated with epinephrine 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 areas 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 and after periods were included. Of the charts included, 65/99 (65.6%) in the before and 136/300 (45.3%) in the after period met criteria for anaphylaxis (p = 0.002). Of the cases meeting anaphylaxis criteria, 41/63 (65.1%) in the before and 88/136 (64.7%) in the after period were correctly identified as anaphylaxis (p = 0.96). Epinephrine was administered in 37/63 (58.7%) of anaphylaxis cases in the before period and 76/136 (55.9%) in the after period (p = 0.70). Anaphylactic patients with only two-system involvement received epinephrine in 20/40 (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 refresher courses 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 relate to better case identification after electronic PCR implementation and changes in paramedic recognition.

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

Mirinda Gormley, Juan Lu, Virginia Commonwealth University CATEGORY OF SUBMISSION: MEDICAL
Background: Emergency medical services (EMS) personnel deliver Naloxone to reverse deadly opioid overdoses. However, EMS personnel face several challenges in providing patient care, including being unable to convince a patient to be transported to the hospital. Without accessing appropriate follow-up care, these patients could overdose again. Objective: Identify characteristics associated with patients who received Naloxone from EMS but refused to be transported to hospital. Methods: Data came from the 2015 National Emergency Medical Services Information System. The incident/patient disposition was used to create a binary outcome (“transported” or “refused”), where “transported, transfer care,” “treated, transported by EMS,” and “treated, transported by Law Enforcement” made up “transported,” and “no treatment required,” “patient refused care,” “treated and released,” and “treated, transported by private vehicle” comprised “refused.” Characteristics included age, gender, race, prior aid, location, U.S. census region, and urbanicity. Descriptive and multivariable logistic regression were utilized.

Results: In 2015, EMS agencies reported 585,108 patients transported by a transport unit during a 9-1-1 response. After treatment, 1.6% of patients refused transportation. These patients were primarily male (65.0%), white (76.8%), and had a median age of 48 (IQR = 32–61). Compared to transported patients, those who refused were more likely to be found in a residence (75.6% vs. 68.0%), or receive aid prior to EMS arrival (60.3% vs. 23.9%). Larger proportions of patients went to the hospital if found in a public location (39.2% vs. 13.5%), or a rural/wilderness area (10.4% vs. 6.6%). Patients who were additionally deemed not to be transporting from a public location rather than a residence (OR = 1.70, 95% CI = 1.58–1.84), and patients in rural/wilderness locations were 1.5 times more likely to be transported than urban patients (OR = 1.58, 95% CI = 1.44–1.73). Patients who did not receive aid prior to EMS arrival were nearly twice as likely to go to the hospital (OR = 1.71, 95% CI = 1.61–1.81).

Conclusions: While effective at reversing fatal overdoses, prehospital administration of Naloxone is not sufficient to address addiction, whereas those transported to hospital could access addiction counselors. EMS agencies should work together with public safety partners to plan how to work with patients most at risk of refusing transport following initial treatment.

115. EMS COMPASS BENCHMARKS USING A NATIONAL EMS DATASET: STATUS EPILEPTICUS AND HYPOGLYCEREMIA PERFORMANCE MEASURES

Jeffrey Jarvis, Dustin Barton, Lauren Sager, Nick Nuddell, William County EMS Category of Submission: MEDICAL

Background: Status epilepticus and hypoglycemia are emergent conditions, both of which can be effectively treated by EMS. It is unclear how often these assessments and treatments are given. EMS Compass is a national organization that has developed several clinical measures. No work has been done to benchmark these measures against large, national datasets. This is necessary for quality improvement efforts and refinement of the measures themselves. We aimed to describe the compliance rates among transported 9-1-1 patients for the following measures: (1) some type of glucose given to those with blood glucose below 60, (2) a blood glucose documented for those felt to be in status epilepticus, and (3) a benzodiazepine given for those in fact to be in status epilepticus. For measures requiring administration of a medication, only ALS providers were included. For each measure, a rate and 95% confidence interval were calculated.

Results: A total of 147,238 patients had a documented blood glucose <60. Of these, 117,358 (79.2%, 95% CI = 0.78–0.80) received some type of glucose. Of 11,148 patients with a status epilepticus, 8,072 (72.4%, 71.6–73.2%) had a blood glucose documented and 6,230 (56.1%, 55.1–56.0%) had some type of benzodiazepine given by ALS agencies. Conclusions: We describe the compliance rates on several EMS Compass measures using a national cohort. We found a low rate of benzodiazepine use for status epilepticus. It is possible that this is a function of poor, non-standard documentation, imprecise measure definitions, or poor clinical performances. In any case, these results identify opportunities for important system improvement.
associated with an adjusted odds ratio of 13.8 (Confidence interval 4.8–39.8) for failure with a standard 5 cm catheter needle decompensation. Concerning the age of the general population, needle thoracostomy with a standard 5 cm needle may be more prone to failure, and may be a significant risk factor for anticipated failure of needle tube decompensation. Alternative anatomic sites for needle thoracostomy do not appear 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 Marshall, Scott Johnson, Stony Brook University Dept of Emergency Medicine, Stony Brook University Hospital, Stony Brook, NY

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 evaluate PS’s 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 educator provided PS with 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 evaluated its effect on PS perception of efficacy and anticipated success of the intervention.

120. Biometric Analyses of Thoracolumbar Movement During Ambulance Transport

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

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, comparison patients maintained positions with and without LSB. We hypothesized that transport on a mattress with the head of the bed elevated 10 degrees would result in reduced 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 included: on LSB at zero and ten degree incline, 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 a rigid thoracic brace when on LSB. Subjects on stretcher without LSB were fitted with a c-collar and were transported with and without foam gel deployment, erosion of ETI skills is identified as a potential collateral effect that requires surveillance.

122. Supraglottic Airway Utilization vs Endotracheal Intubation Pre/Post Deployment of the I-Gel LMA in the Prehospital Setting

John Lyng, Michael Perlmutter, Alex Trembley, II, Marc Conterato, Michelle 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. Descriptive statistics were utilized. Results: A total of 660 charts were abstracted, 259 cohort M and 401 cohort I. Age (57.5 ± 19.9y), 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 11.9% 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 I was ETI 84.0% and SGA 40% in cohort K, and ETI 80.1% and SGA 92.2% in cohort I. First successful 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 any 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, and a final 98% overall success rate. Introduction of the i-gel resulted in an increase in use of SGAs as a primary device, and neutral effect on use of ETIs as a secondary device. Despite that successful invasive airway management by any device improved following i-gel deployment, erosion of ETI skills is identified as a potential collateral effect that requires surveillance.
123. I Love My Community Paramedic: Patients Report Overwhelming Satisfaction with Community Paramedic Program
Tia Radant, Paula Miller, Joseph Pasquarella, Ann Majerus, Jennifer Murphy, Stephen Bloomstrand, Aaron Burnett, Regions Hospital
EMC CATEGORY OF SUBMISSION: OPERATIONS, QUALITY, SAFETY SYSTEMS, DISASTER

Background: Patient satisfaction is a key indicator of healthcare quality. Community Paramedic (CP) is an emerging profession and as such there is limited data on patient satisfaction with CP programs. Hypothesis: Patients enrolled in 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 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. Results: A total of 59 patients completed surveys regarding their satisfaction with the program. Mean scores for each question were as follows: willingness to recommend care (4.0), 100% of patients stated they would recommend the program to others. Conclusions: Patients provided overwhelmingly positive feedback on the CP program. Patients’ 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 big difference, I was so overwhelmed at that time.” “I was so overwhelmed at that time. When I go to the hospital, I’m 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 big difference, I was so overwhelmed at that time.” 

126. Community Paramedic Point of Care Blood Analysis: Validity and Usability Testing of Two Commercially Available Devices
Ian Blanchard, Ryan Kozicky, Dana Dalgaro, Stacy Coulter, Suzanne Snozly, Karen Leaman, Susan Biesbrock, Lenore Page, Lyle Redman, Keith Speckman, Tyler White, Emily Doig, Gerald Lazarenko, Alberta Health Services/University of Calgary
EMC CATEGORY OF SUBMISSION: PROFESSION

Background: Community Paramedics (CPs) require access to timely blood analysis in the field to guide treatment. Point of care testing (POCT), as opposed to traditional laboratory analysis, may offer a solution, but limited research exists on CP POCT. Purpose: In the CP setting, to assess the validity of two devices (Abbott i-STAT and Alere epic) and contrast their usability. Methods: In a CP programme responding to 6,000 annual patient care events, a split sample validation of POCT against traditional laboratory analysis for seven analytes (sodium, potassium, chloride, creatinine, hemoglobin, hematocrit, and glucose) was conducted on a consecutive sample of patients requiring blood analysis. The difference of proportion of discrepant results between POCT and laboratory was compared using a two sample proportion test. Usability was analysed by survey of CP experience, linear mixed effects model of Systems Usability Scale (SUS) adjusted for experience, expert heuristic evaluation of devices, device-logged errors, and coded observations of quality control testing. Results: Of 1,649 study period patient care events, 174 had a blood draw, with 108 events (62%) enrolled from 21 participants. Participants had a mean age of 58.7 years (SD±13.6); 49% were female. In 4 of 646 (0.6%) individual comparisons, POCT reported a critical value but the laboratory did not; occurring more often in i-STAT (0.9%; 95% CI: 0.0%, 1.9%) compared to epic (0.3%; 95% CI: 0.0%, 0.9%; p = 0.323). There were no instances of the laboratory reporting a critical value when POCT did not. In 88 of 1,046 (8.4%) individual comparisons the a priori defined acceptable discrepancy between POCT and the laboratory was exceeded; occurring more often in epic (10.7%; 95% CI: 8.1%, 13.3%) compared to i-STAT (6.1%; 95% CI: 4.1%, 8.2%; p = 0.007). Eighteen of 19 CP surveys were returned, with 11/18 (61.1%) preferring i-STAT over epic. This survey had a high mean SUS score compared to the epic (84.0/100 vs. 59.6/100; p < 0.011). Fewer field blood analysis device-legged errors occurred in i-STAT (7.8%; 95% CI: 2.9%, 12.7%) compared to epic (15.3%; 95% CI: 9.3%, 21.7%; p = 0.063). A possible explanation may relate to usability issues with the epic cartridge and test menus. Conclusions: CP programs can expect valid results from POCT in most instances, however an important discrepancy between traditional laboratory did occur. Usability assessment suggests a preference for i-STAT.

127. Characteristics of Paramedic Graduates Who Retest After an Unsuccessful Attempt at a National Cognitive Examination
Ashley Larrimore, Rebecca Cash, Remle Crowe, Madison Rivard, William Krebs, Jeremy Miller, Ashish Fanchal, Department of Emergency Medicine, The Ohio State University Wexner Medical Center
EMC CATEGORY OF SUBMISSION: OPERATIONS, QUALITY, SAFETY SYSTEMS, DISASTER

Background: Paramedic program graduates involved significant time with prepa- ring their training. However, some graduates are
unsuccessful on the national paramedic certification examination on their first attempt. The proportion of paramedic graduates who do not retest on their first attempt is unknown. The objective was to describe paramedic graduates who do not retest and their associated characteristics. We hypothesized that few graduates chose not to retest and retesting was not associated with specific candidate characteristics.

Methods: We conducted a cross-sectional evaluation of the national paramedic certification cognitive examination results for the class of 2013. This 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 a minimum of 80 to a maximum of 150 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. Graduates 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 test takers. Results: In 2013, 11,090 paramedic graduates attempted the national paramedic certification examination with female graduates having a lower retest rate. This study was limited by information concerning retesting details of each resubmission attempted by a large, urban fire-based EMS system. Data was analyzed from January 1, 2013 through August 15, 2016. The BMI recorded was a subjective measure and not calculated. Second, the data is from a single system cardiac arrest registry and may not be generalizable to other systems.

Background: Sudden cardiac arrest (SCA) continues to be the leading cause of death in the U.S. Current studies suggest that there is no strong correlation between BMI and resuscitation 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-hospital cardiac arrest registry containing details of each resuscitation attempted by a large, urban fire-based EMS system. Data was analyzed from January 1, 2010 through August 15, 2016. The BMI recorded was a subjective measure and not calculated. Second, the data is from a single system cardiac arrest registry and may not be generalizable to other systems.

Background: Palliative care is aimed at alleviating pain and distressing symptoms while offering support. Paramedics routinely respond to palliative patients and can assist with symptom relief. In Nova Scotia, a novel clinical practice guideline was implemented enabling paramedics to assist families with home medications, collaborate with on-scene care teams, or to administer opiates through an expanded EMS formulary with the goal to treat at home if the patient desired. A retrospective review of the dose and range of opiates for palliative care is increasing. Our objective was to describe paramedic administration practices for the management of pain and breathlessness.

Methods: We conducted a retrospective review of 100 consecutive palliative care responses from February 1, 2016 to June 30, 2016. An electronic query would fail to capture....
ure assistance with home medications; a man- 
unal chart review including standard medication 
istration fields and the free-text narrative was 
was needed to fully capture the care provided. 
 descriptively conducted and results were reported with n and % or mean and standard deviation. Results: Study population included 94 unique patients; 6 patients had 2–4 calls and the remaining had one. Paramedics administered ketamine to 58 (58%) patients, and of those 42 (72.4%) remained at home compared to 17/42 (40.5%) with no medication. Most common reason for treatment was pain; despite this, only 36 (80%) pain patients received treatment and 6 (13.3%) had both pre- and post-treatment pain scores. Only 12 (44.4%) breathlessness patients received medication. Paramedics assisted with 
home medication 10 (17.2%), administered from 
mg patients received treatment and 6 (13.3%) had both pre- and post-treatment pain scores. 

132. Ketamine Indications in Statewide Treatment Protocols
Christie Fritz, Christina Loporcaro, David Schonfeld, Student, 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 hemo-
dynamic profile than many of its alternatives for the same indications. It can be adminis-
tered through the intravenous, intraosseous or intramuscular routes. The purpose of this investiga-
tion is to describe the overall prevalence of ketamine in STPs and the indications for which it is utilized. Methods: Cross sec-
tional 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 ALS STPs, seven of which serve as guidelines. 48% of STPs include ketamine as an approved medication in their pharmacopeia. Ten states (32%) include ketamine for induc-
tion 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 intravenous administration for ketamine. 75% of protocols have been revised since 2015 and all have been revised within the past 5 years. Conclusions: Ketamine is versatile medication with a variety of applications in prehospital care. Despite this, less than half of STPs include ketamine in their pharmacopeia, and the majority of those that include it have limited indications. Ketamine is a hemodynamically stable option for pain control or induction for RSI, but a minority of states with STPs include ketamine for these indications. Ketamine has had a recent resurgence in emergency medicine, although most protocols have been revised in the last 3 years, it is unlikely that protocol revision tim-
ing has been a barrier to ketamine adoption into STPs. Future research 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 Doreswamy, Thomas Rea, Michael Sayre, Mickey Eisenberg, University of Washington Department of Emergency Medicine, Category of Submission: Student, Resident, Fellow
Background: In recent years, the costs of epinephrine autoinjectors (EALs) 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” program to replace EALS by teaching emergency medical technicians (EMTs) to manually aspirate epinephrine from a single-use 1 mg/mL epinephrine vial and syringe followed by prehospital intramuscular admin-
istration of the correct adult or pediatric dose of epinephrine to treat for serious allergic reaction. Treatment was guided by an EMT protocol that required a trigger and symptoms. We sought to determine if the “Check and Inject” program was safely implemented by EMTs treating presumed prehospital anaphy-
lexia 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 and January 2016 through December 2016 within the major American city located within the county. All cases were prospectively collected using a custom quality improvement data form completed by the first responding EMTs. Two physicians completed a structured review of each EMS medical record to determine if the EMTs followed the “Check and Inject” protocol and if epinephrine was clinically indicated based on physician review. Results: Of the 411 cases eligible for analysis, EMTs followed the protocol appropriately 367 (89.3%) cases. In the remaining 44 (10.7%) cases, the EMT incident report form failed to document either a clear inciting allergic trigger or an appropriate symptom from the protocol list. Physician review determined that epinephrine was clinically indicated in 36 of the 44 cases. Among the remaining 8 cases (1.9%) that did not meet protocol criteria and were not clinically indicated based on physician review, none had a documented adverse reaction to the epinephrine. Conclusions: We observed that EMTs successfully implemented the manual “Check and Inject” program for severe allergic reactions and anaphylaxis in a manner that typically agreed with physician review and without any overt identified safety issues.

134. Timely Treatment of Tiny Tumors: The Use of Oral Ondansetron in the Prehospital Environment
Kelly Meehan-Cousseau, Abhijit Srung-
vagaye, Johnah J, Michael Bohanske, J. Matthew Shull, Tania Strout, Maine Medical Center Emergency Medicine Division of EMS, Tufts University, Category of Submission: Student, Resident, Fellow
Background: Nausea and vomiting are com-
mon emergency department (ED) complaints. While oral rehydration therapy is the preferred treatment modality for dehydration, emesis is a therapeutic barrier. In 2013, Maine’s statewide Emergency Medical Services (EMS) proto-
col added oral ondansetron to the prehospital administration to children with nausea and vomiting, as unnecessary prehospital intra-
venous (IV) catheter placement is associated with discomfort, prolonged scene time and increased cost. Prehospital oral ondansetron administration has not been eval-
uated for clinical endpoints. Our objective was to evaluate the impact of prehospital oral ondansetron administration to pediatric patients on frequency of use, additional inter-
ventions, ED length of stay, rate of hospital admission and ED recidivism. Methods: We conducted a simple interrupted time-series analysis to assess the effect of oral ondansetron availability on study endpoints. Pediatric patients transported via EMS to our tertiary care pediatric referral center ED who received either oral or IV ondansetron in the prehospital setting for nausea or vomiting from 2011–2015 were included. Pre- and post-oral ondansetron protocol implementation groups were com-
pared using chi-square, Fisher’s exact or t-test as appropriate. Results: A total of 48 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 receiving oral ondansetron in the prehospital setting was noted following protocol implementation (48% vs. 74%, p = 0.002). This was associated with a significant decline in the proportion receiving prehospital IVs (100% vs. 68%, p = 0.010) and prehospital IV ondansetron (100% vs. 53%, p = 0.002). Significant changes in other prehospital (p = 0.161) or ED interventions (p = 0.192), length of stay (p = 0.253), hospital admission rates (p = 0.161), or 48-hour ED return visits (p = 0.234) were not observed. Conclusions: The results of this study suggest that the availability of prehospital oral ondansetron increases the frequency of antiemetic 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 ondansetron may mask a medical or sur-
gical emergency, this study suggests that pedia-
tric patients treated with ondansetron pre-
hospital are not at increased risk of symptom-
masking and subsequent return ED visits.

135. Use of a Community Paramedic Program to Address High Utilizers of the 9-1-1 System
Thomas Gravey, Mario Colella, 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, attempting to decrease unnecessary use of resources and improve patient life. Objective: To determine if enrolling high utilizers of the 9-1-1 system in a one month community paramedic prehospital system usage. Methods: This is a retrospective chart review. Data from MFD’s program in 2016 was reviewed. 9 out of 12 months had patients enrolled in the program at any given time. Each month the patients enrolled were reviewed with the 6 months prior to participation compared to
137. PREHOSPITAL AVAILABILITY AND USE OF MEDICATIONS FOR MANAGING HAZMAT EMERGENCIES

Kubwimana Mhaymagurur, Amber Bel- lifante, Eric Leventon, Robert French, Joshua Gaither, Kristina Waters, Frank Walter, The University of Arizona Cate- gory of Submission: STUDENT, RESIDENT, FELLOW

Background: A minimal amount is known about prehospital availability and use of med- ications to treat hazardous materials (hazmat) emergencies. The purpose of this study was to identify the availability and use of hazmat medications among paramedics with advanced hazmat training. A prehospital set- tings in the United States (U.S.). Methods: An email Qualtrics survey was sent to U.S. paramedics who completed an Advanced Hazmat Life Support (AHLs™) Provider Course from 1999-2017. The survey asked what spe- cific hazmat medications were available to each respondent, how they were used, and how frequently they were used. For analysis, responses were grouped into those medica- tions with hazmat logical use 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 con- sidered to have been used if the surveyed paramedic gave them all in the last five years. Results: Of the 1,378 surveys sent, 784 (18.0%) were completed. Of the completed sur- veys, 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 465 (99.1%) / 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 haz- mat medications with other uses was: atropine 515 (63.5%) / 63 (8.0%), calcium chloride 540 (68.9%) / 83 (10.6%), calcium gluconate 247 (31.5%) / 26 (3.3%), dexamethas 496 (63.5%) / 49 (6.3%), lidocaine 989 (12.6%) / 18 (2.3%), midazolam 619 (79.0%) / 29 (3.7%), ophthalmic topical anesthetics 294 (32.4%) / 50 (6.4%), and topical lidocaine 550 (69.0%) / 28 (3.6%). Conclusions: Among paramedics with AHLs™ Provider training there is limited availability and use of hazmat medications. Although local scope of practice, financial, and other geo- graphical considerations likely contribute to these results, further work is needed to iden- tify which medications should be available to paramedics to optimize the cost benefit ratio of stocking and using hazmat medications.

138. VALIDATION OF A PREHOSPITAL FALLS RISK ASSESSMENT TOOL

Alisson Infinger, Meghan Wally, Rachel Seymour, Jonathan Studzinski, Hackensack EM Agency Category of Submission: TRAUMA

Background: Every 15 seconds an older adult will present to the emergency room with a fall related injury. Prevention programs have demonstrated effectiveness, however, health care providers must be able to identify at risk patients. This study aimed to develop a con- tent valid tool to predict the environment of envi- ronmental fall risk performed in the prehospital setting. Methods: First, we identified validated items for risk factors from the liter- ature. 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 prehospital use and rated by EMS professional- s for clarity, relevance, and feasibility. The draft assessment tool was developed for field testing with two parameters to determine the feasibility and frequency of item inclusion. Following descriptive analysis and structured interviews, a second field test was conducted with a revised tool. Paired t-tests were conducted to assess differences. Results: A total of 87 items measured extrinsic factors were identified. Round one of content validity testing eliminated 33 items (CVI ≤ 0.67). Items excluded were removed due to redundancy. Round two elimi- nated 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. A field test of field testing (n = 12) revealed paramedics infre- quently accessing the kitchen (41.6%), bathroom (0.0%), or bedroom (25%) and excluded room-specific items. Five crews completed 57 paired assessments in round two using a nine- item tool. One item (n = 4) returned a high level of agreement, whereas the remaining items showed low to moderate agreement (κ = 0.332-0.536). 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- ties of providers on scene. Future efforts should test the accuracy of extrinsic assessment among secondary care providers only.

139. DEVELOPMENT OF A HYPOXIC ASPHYXIAL MODEL OF PSEUDO-PULSELESS ELECTRICAL ACTIVITY IN SWINE

Norman Paradis, Sarah Crockett, Jeffrey Gould, Christopher Kaufman, Karen Moodie, Dartmouth-Hitchcock Medical Center Category of Submission: CARDIAC

Background: Pulseless electrical activity (PEA) is an increasingly prevalent initial rhythm in cardiac arrest, particularly in in-hospital resus-citation. Pseudo-Pulseless Electrical Activity (pPEA), which often precedes true PEA, is characterized by a slow-flow state in which cardiac contraction pro- duces a non-palpable blood pressure that 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- ogy and therapy. Methods: A state of p-PEA was induced via progressive hypoxia in twelve domestic swine ~22 kg with standard physio- logical monitoring. Blood flow was measured in the common carotid artery and jugular vein. FiO2 was reduced to 6% by increasing the frac- tion of nitrogen in inspired gas. At a plateau blood pressure (SBP) of 40 mmHg was used to mimic p-PEA. After resuscitation, the anim- als were stabilized. This cycle of p-PEA and resuscitation was repeated until return of spontaneous circulation could not be achieved. Results: p-PEA could be reliably induced by hypoxic asphyxiation. In this model, p-PEA was characterized by a mean heart rate of 77 ± 16 bpm, mean aortic blood pressure of 23 ± 5 mmHg, mean right atrial pressure of 2.2 mmHg, mean carotid flow of 48 ± 16 ml/min, mean jugular flow of 10.5 ± 4.3 ml/min, and mean intracranial pressure of 24 ± 3 mmHg. Time to achieve target systolic blood pressure was sig- nificantly less in the short round, however,
the physiological responses were similar for both rounds. Conclusions: A reproducible, sta-
ble and clinically relevant porcine 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 Oloha, Meghan Broadbent, International Academies of Emergency Dispatch Category of Submission: CARE

Background: Identification of acute myocardial infarction (AMI) can be complicated by the wide variety of symptomologies or pre-
sentations. While the most common symp-
tom of AMI is chest pain, so-called “atypi-
cal” presentations are in fact quite common and extremely variable, and AMI sometimes presents with very mild-seeming symptoms such as flu-like chills and nausea, abdominal pain, or lightheadedness. Correctly identifying mild-seeming presentations that actually turn out to be AMIs can help ensure appropri-
ate response and treatment. This study iden-
tifies and confirms AMI cases coded as low-acuity at dispatch 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 ser-
dices (EMS), and hospital discharge datasets. The study sample included all cases that arrived to the hospital via EMS. Primary outcome mea-
ures were the numbers of hospital-diagnosed AMIs categorized by patient age and gen-
der, Chief Complaint Protocol, and dispatch de-
dominator code; secondary measures were compari-
sons between EMD- and EMS-coded symp-
tomations. Descriptive statistics were used to character-
ize the distributions of all ALPHA-
level cases and of ALPHA-level AMIs, cate-
gorizations by hospital discharge destinations, and Chief Complaint. Results: A total of 8,007 ALPHA priority-level cases with correspond-
ning hospital records were identified. Of these, 40 (0.50%) were identified as AMIs. These ALPHA-level AMI cases fell into only five Chief
Complaint Protocols (Sick Person, Falls, Uncon-
scious/Fainting, Abdominal Pain/Problems, and Hemorrhage/Lacerations). Older age and discharge to medical facility (rather than home or self-care) were identified with AMI cases. The most commonly reported symptom was a fall, especially ground-level falls in an elderly-age patient. Certain “sick person” char-
acteristics were also somewhat associated with AMI diagnosis. Conclusions: Overall, the num-
ber of AMI cases assigned to the ALPHA pri-
ority level 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 missed or silent AMIs widely described in other healthcare set-
tings.

141. Heat Index Is the Main Factor Influencing Rates of Patient Presentation at East Carolina University Football Games

An Truong, Stephen Taylor, Roberto Portela, Kurt Brewer, Springhill School of Medicine, East Carolina University Category of Submission: STUDENT, RESIDENT, FELLOW

Background: Mass gathering events are large gatherings of greater than 1000 people where access to care is difficult and response by emergency medical services (EMS) may be delayed. Current literature suggests that mul-
tiple factors can influence patient presenta-
tion rates during these events. Local emer-
genecy physicians and EMS provide medical care at East Carolina University (ECU) foot-
ball games with a stadium capacity of 51,082. ECU football games are typically staffed by six EMS units with field’s perimeter, one field-dedicated EMS unit, and 2 Med-
cal Treatment Areas staffed with four physi-
cians. Cooling and hydration are mandated needed based on weather forecasts for the game. Objective: This study aimed to quantify patient presenta-
tion rates and factors influencing patient pre-
sentation during ECU football games between 2008 and 2016. Methods: A retrospective review of EMS 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 relation-
ships 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 with attendance rang-
ing from 33,048 to 51,082 were included. The heat index during the games ranged from 37.8 to 89.6°F. Kickoffs were held from 1200 to 2000 hours. Bivariate correlation analysis of heat index and patient presentation was calcu-
lated as 0.432 (p < .05). This result sug-
gests a positive correlation between heat index and patient presentation rates. 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 any statistical significance. Conclusions: Heat index values were shown to have a moderately strong correlation with rates of patient present-
ation 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 Antey, Kenneth Scheppke, Juan Car-
dona, Steve Maraj, Frank Rabine, Julie Corona, Paul Pepe, Memorial Healthcare System Category of Submission: MEDICAL

Background: Over-utilization of 9-1-1 systems is a nationwide problem that burdens 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 dimin-
ish EMS responses for those patients. Meth-
ods: Between April 1, 2015 and December 31, 2016, front-line EMS crews, guided by estab-
lished criteria, referred potential hospice can-
didates to a single designated CP who visited those patients at their residence then referred those meetings to the CP's criteria to a hospice partner (VITAS Healthcare) for enrollment. Demographics, diagnoses, length of stay (LOS), and outcomes were collected for patients enrolled. The associated 9-1-1 utilization, before and after enrollment, was tracked and mea-
ured. Results: The CP attended 320 poten-
tial hospice cases over the 21-month period. Of the 136 patients seen in 2015, 42 (30.90%) were enrolled in hospice and, similarly, 64 of 184 (34.8%) seen in 2016 were also enrolled. Of these 106 total patients enrolled, 58 were men and 48 were women. While ranging in age from 3 to 86 years, 92.5% (n = 101) of the patients used their full 6-month hospice benefit. Another 11.3% (n = 12) were still enrolled at the end of the 9-1-1 responses for this cohort (prior to hospice enrollment) had been 439. This fell to 17 after enrollment (98.1% reduction in related EMS utilization). Conclusions: Based on this experience, it is concluded that community paramedic programs can play a very important role in facilitating the care of hospice-eligible patients and thus help to avoid unneeded EMS system utilization for such patients. Appropriate education of front-line EMS profession-
als, working in synchrony with a designated CP, can reduce unneeded 9-1-1 utilization, but, more importantly, facilitate the most appropri-
ate and expert care through hospice-partner resources.

143. Prehospital Provider Year of Hire Correlates to Time Spent on Scene in Emergent Trauma

Clark Smith, Steven Hulac, Spencer Knierrm, Zachary McDade, David Brown, Wake Health and Hospital Authority Category of Submission: TRAUMA

Background: The definitive prehospital man-
agement of critically-injured blunt or penetra-
ting trauma patients is rapid transport to a trauma center. Retrospective studies of trauma registry data have indicated that prolonged on-
scene times may worsen outcomes for critically-injured patients. The preponderance of available research suggests that optimal man-
agement of these patients is the provision of basic stabilization measures while minimizing time spent on-scene. The objective of our study was to investigate if prehospital provider date of hire was associated with time spent on-scene in patients transported emergently with traumatic injuries. Methods: We conducted a data analysis of emergency medical system transports from a trauma center. Retrospective studies of trauma registry data have indicated that prolonged on-
scene times may worsen outcomes for critically-injured patients. The preponderance of available research suggests that optimal man-
agement of these patients is the provision of basic stabilization measures while minimizing time spent on-scene. The objective of our study was to investigate if prehospital provider date of hire was associated with time spent on-scene in patients transported emergently with traumatic injuries. Results: A total of 2,910 emergent trauma patients was analyzed. The associated 9-1-1 utilization, before and after year of hire on average on-scene time at higher rates of patient presen-
tation for those patients. Methods: We com-
pared the mean on-scene times for paramedics over this period, aggregated by year of hire. We excluded calls in which the provider indicated a speci
cal delay or barrier to care in the electronic patient care record. Results: During the study period, paramedics from the included years of hire transported a total of 2,910 emergent trauma patients. The number of emergent trauma transports for paramedics from each year of hire ranged from 179 to 380. Paramedics with earlier years of hire have lower average on-scene times than those hired late. Paramedics hired in 2006 average 7.16 minutes on scene, while paramedics hired in 2015 average 9.14 minutes on scene. Linear regression of this data yielded an R-squared value of 0.82. Utilizing post-hoc power analys-
s, there was a significant effect of year of hire on average on-scene time at the p < .05 level (F[2,290] = 4.17, p < .05). Conclusion:
There was a significant association between paramedic year of hire and on-scene times in emergent transports of trauma patients. This is the first study comparing providers' years in service to their on-scene times with critically injured patients. Further research is needed to determine if this trend holds across more agencies and to investigate its impact on patient outcomes.

Methods: Using anonymous data from 9-4-1 consenting participants, we retrospectively identified a pre- and post-education intervention conducted between SEP 2016 and MAR 2017, and subjects were asked to complete a questionnaire assessing personal comfort levels and their knowledge and attitudes about tourniquets and responding to traumatic emergencies. Each intervention included 20 minutes of didactic instruction on hemorrhage control techniques, encompassing indications for tourniquets, and hands-on instruction with 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 participating patients, 218 met eligibility criteria. When initially asked if they would use a tourniquet in real life 64% (140/218) responded “Yes”. Following training, 96% (194/203) of 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 response (2.5 vs. 4.0, based on a 5-point Likert scale, p < 0.001). Conclusions: In this hemorrhage control education study we found that a short, formal intervention can improve layperson’s self-efficacy 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 act should be addressed when designing future hemorrhage control education campaigns. Community education should continue to be a priority of the “Stop the Bleed” campaign.

146. Can Prehospital Providers Correctly Triage Patients to Freestanding Emergency Departments?

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 facilities that provide care for most emergencies but do not have all the resources that hospital-based emergency departments (EDs) offer. Although freestanding emergency medical services (EMS) must routinely determine whether a FSED is an appropriate destination. Inappropriate triage may increase mortality and mortality due to delay in definitive care. We sought to evaluate 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, dialisys, 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 fully at a FSED without additional resources. We sought to identify the percentage of patients brought by EMS to FSEDs that were discharged without additional hospital-based services. Results: 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 selected destination (FSED), left before FSED disposition, or were transferred from the FSED to unaffiliated hospitals. A total of 1,184 patients (94.7% 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 transferred patients to a hospital-based ED instead of a FSED because the main hospital-based ED had more resources. Conclusions: The primary goal of triage is “determining how best to get the right person to the right place at the right time with the right amount of resources”. The bureaucratization of FSEDs highlights the significance of this critical concept. As FSEDs become more popular, a burden is frequently placed on paramedics to determine which patients are appropriate for specific emergency department access. Our AEDs demonstrated that paramedics have a reasonable ability to appropriately triage patients to FSEDs and to predict the need for hospital resources.

147. Outcome Impacts of Community/Citywide Defibrillation Programs

Patrick Chow-In Ko, Shih-Chir Hwang, Yu-Wen Chen, Hong-Ni Hsian, Matthew Hur, Ming Ma, Chung-Liang Shih, National Taiwan University, College of Medicine, Department of Emergency Medicine Category of Submission: CARDIO

Background: We compared the outcomes between a community-wide bystander 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 metropolitian OHCA e-Registry was studied, after a citywide bystander defibrillation rescue program had been launched that strategically provided public-access 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 regression analysis. Results: The density of public AEDs distribution increased from 6.24 per square kilometers in the studied 2 years. Among a total of 6,356 OHCA, 627 patients occurred at public locations, including 25 patients (4%) with ROSC (no defibrillation) and 223 patients (35.6%) with ROSC who 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) survival-to-discharge patients achieved 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. 16.0%, OR: 6.6 (95%CI: 2.9-14.9) for good CPC; and 100% vs. 65.1% for good CPC among survival-to-discharge) compared with those 235 patients by dispatcher-assisted CPR rescue. In 28 patients by bystander defibrillation rescue only one man without prehospital ROSC still achieved survival-to-discharge with good CPC. Conclusions: For OHCA patients at public locations, we found that a community-wide bystander defibrillation program is 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


**Background:** Shear is a known risk factor in pressure injury development such as decubitus 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 on an ambulance stretcher.

**Methods:** This was a randomized, cross-over design. Thirty adult volunteers in 3 BMI categories served as their own controls. PRE-TRA shear, pressure, and comfort sensors were attached to the sacrum, ischial tuberosity (IT), and heel. The stretcher was placed in sequential 0°, 15°, and 30° elevations, with and without ASMO. The ambulance traveled 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 series of 5 runs. **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 Newtons (Nm) lower for ASMO compared with standard surface (p = 0.057). Compared with 0°, elevations of 15° and 30° increased these levels by 2.41N (p < 0.001) and 3.44N (p < 0.001), respectively. Using 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 pressures 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, pressure, and discomfort. During transport, subjects should probably 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 Csizsler, 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. Sleep disorders are common, often overlooked contributors to fatigue. We sought to examine the prevalence of common sleep disorders and their impact on occupational safety.

**Methods:** A nationwide cross-sectional study collecting data from 66 fire departments across the US who participated in a workplace-based sleep disorder screening and education program from 2013-2015. Providers were screened for common sleep disorders using reliable and valid screening questionnaires and asked a series of questions about adverse safety outcomes which occurred in the past month. The cooperation rate was 58.6%. For this secondary analysis, the dataset was limited to participants who reported any primary responsibility as medical care and listed an EMT-Basic or higher certification. The prevalence of common sleep disorders is reported using descriptive statistics. The association between sleep disorder screening and resultant outcomes was tested using multi-level mixed effects logistic regression models which accounted for clustered responses. Models controlled for individual and agency-level risk factors, including age, gender, body mass index, exercise frequency, years of experience, shift schedule, work at multiple jobs, and annual call volume. **Results:** Responses were obtained from 2,992 fire-based EMS providers employed at 65 departments. Most were male (93%), full-time employees (99%), who worked 24 hour shifts (77.2%). One in three was obese (35.2%). Nearly half (45.1%), screened positive for at least one sleep disorder. Over 1/3 (33.9%) screened positive for obstructive sleep apnea, 7.5% screened positive for insomnia, and 10.1% screened positive for shift work disorder. More than 2/3 (71.6%) reported sleeping less than 7 hours per night on average and 33.8% had excessive daytime sleepiness. After controlling for potentially confounding variables, positive sleep disorder screening was independently associated with more than twice the odds of an occupational injury (OR 2.04; 95% CI 1.48–2.81), motor vehicle crash (OR 2.10; 95% CI 1.54–2.86), near-crash (OR 2.27; 95% CI 1.94–2.66). **Conclusions:** Sleep disorders are highly prevalent among EMS providers. Sleep disorder screening may help to identify providers who are vulnerable to adverse safety outcomes.

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 no current evidence to inform the decision of ventilation in this population. Current practice varies by group and area. The purpose of this study was to evaluate the effectiveness of manual BVM ventilation support in our population of severely injured trauma patients. We hypothesized that manual control of ventilation would provide adequate support to maintain a physiologic end-tidal carbon dioxide (ETCO2).

**Methods:** We developed four simulation 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 two-person 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 the four scenarios: domestic abuse (n = 44, 33%), motor vehicle collision (n = 44, 16%), deceased mother (n = 68, 25%), and intoxicated homeless person (n = 66, 24%), with <3% missing data across elements. 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 two-person team. The evaluator to participant ratio was 1:1. Characteristics were compared using chi-square tests.

**Conclusions:** A total of 272 EMS providers were evaluated across the four scenarios: domestic abuse (n = 44, 33%), motor vehicle collision (n = 44, 16%), deceased mother (n = 68, 25%), and intoxicated homeless person (n = 66, 24%), with <3% missing data across elements. 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 two-person team. The evaluator to participant ratio was 1:1. Characteristics were compared using chi-square tests.

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, Ashish 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 response to violent encounters. Our objective was to develop and validate scenarios to evaluate EMS providers’ response to threatening situations. We identiﬁed settings that would not differ given different patient presentations and scenarios.

**Methods:** Using an iterative process, EMS physicians, EMS educators and law enforcement training staff developed four simulation 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, 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 two-person team. The evaluator to participant ratio was 1:1. Characteristics were compared using chi-square tests.

**Results:** We collected 202 face-to-face interviews that alert providers to the potential for violence. The characteristics of threatening encounter phases that alert providers to the potential for violence were highly prevalent among EMS providers. Current practice varies by group and area. The purpose of this study was to evaluate the effectiveness of manual BVM ventilation support in our population of severely injured trauma patients. We hypothesized that manual control of ventilation would provide adequate support to maintain a physiologic end-tidal carbon dioxide (ETCO2).

**Conclusions:** A total of 272 EMS providers were evaluated across the four scenarios: domestic abuse (n = 44, 33%), motor vehicle collision (n = 44, 16%), deceased mother (n = 68, 25%), and intoxicated homeless person (n = 66, 24%), with <3% missing data across elements. 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 two-person team. The evaluator to participant ratio was 1:1. Characteristics were compared using chi-square tests.

**Conclusions:** A total of 272 EMS providers were evaluated across the four scenarios: domestic abuse (n = 44, 33%), motor vehicle collision (n = 44, 16%), deceased mother (n = 68, 25%), and intoxicated homeless person (n = 66, 24%), with <3% missing data across elements. 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 two-person team. The evaluator to participant ratio was 1:1. Characteristics were compared using chi-square tests.

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

Alex Carter, Judah Goldstein, Marianne Arab, Michelle Harrison, Wilma Crowell, Katherine
Houdé, Jan Jensen, Mireille Lecours, James Sullivan, Carolyn Villard, Kathryn Downer, Dalhousie University Category of Submission: Operations, Quality, Safety, Systems, Disaster

Background: Paramedics are called for crisis and symptom management for patients receiving palliative care. To address the mismatch between patient care and the patient's goals of care, a new program was implemented in two provincial EMS systems. Prior to program implementation, 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 prospective, cross-sectional electronic survey was delivered before and after 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%) responded; 105 were LEAP trained paramedics (PCPs) (44.2%). Post-launch, 267 responded (21.3%), 118 by PCPs (44.2%). Paramedic comfort to provide palliative care without transport increased: pre = 3 (IQR 1) vs. post = 3 (IQR 1), p < 0.00001, where 4 = very comfortable. Comfort to provide palliative care with transport increased: pre = 3 (IQR 1) vs. post = 3 (IQR 1), p < 0.00001. Confidence in having the right interventions tools to deliver palliative care increased from: pre = 2 (IQR 1) to post = 3 (IQR 1) = <0.00001. For care without transport to hospital: pre = 2 (IQR 1) to post = 3 (IQR 1), p < 0.00001. Respondents strongly agreed that all 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. Paramedics strongly agree with paramedic administration of palliative care, cite patient comfort as 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 ON PEAK AIRWAY PRESSURE

Leonard Weiss, Gabriel Diamond, Thomas Segerson, Justin Talarico, Francis Guyette, Christian Martin-Gill, Torben Becker, University of Florida Category of Submission: Cardiac

Background: Our prior pilot data demonstrated that mechanical ventilation during critical care transport using the King Laryngeal Tube Deflatable 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 wish to determine prehospital and in-hospital complications associated with use of King-LTD when PIP with mechanical ventilation is above or below 30 cmH2O. Methods: We retrospectively reviewed all King-LTD uses with mechanical ventilation in a large multi-state prehospital critical care transport service from December, 2006 through November, 2015. Cases of dis-continuation of ventilatory efforts with King-LTD or missing PIP data were excluded. Primary outcomes are the incidence of prehospital complications (cardiac arrest, oxygenation or ventilation failure, emesis, and documented air leaks) and where hospital outcome data were available, the incidence of aspiration on radiologic studies (compared with chi square tests). We secondarily compared prehospital oxygenation and ventilation parameters in: in-hospital ventilator days, ICU days, hospital days, and in-hospital death, using descriptive statistics. Results: Of 138 patients with in-hospital data with PIP ≥ 30 cmH2O at any time (N = 74, 54%) vs. PIP < 30 cmH2O (N = 63, 46%), final hospital vital parameters were SpO2 99.5 (IQR 96–100) vs. 96.5 (IQR 95–100), I/E ratio 2:3 (IQR 2:1–3) vs. 3:2 (IQR 2:1–3), etCO2 39 (IQR 29–38). Prehospital complications occurred in 11 (8%) vs. 10 (7%) (p = 0.68). Of 87 patients with in-hospital data with PIP ≥ 30 cmH2O (N = 46) or < 30 cmH2O (N = 41), incidence of aspiration was N = 11 (23.9%) vs. N = 5 (12.2%) (p = 0.33). Of 110 ventilator days were 4 (IQR 1–10) vs. 3 (IQR 1–11.5), ICU days were 3.5 (IQR 2–16) vs. 3 (IQR 2–19), and hospital days were 8 (IQR 3–16) vs. 7.5 (IQR 2–27). N = 19 (40.4%) vs. N = 13 (31.7%) died. Conclusions: Although confounders such as aspiration prior to airway placement may exist, these data suggest that patients receiving mechanical ventilation via the King-LTD with PIP ≥ 30 cmH2O have similar incidence of prehospital and in-hospital complications.

154. THE EFFECT OF IV VS. IO ACCESS IN PREHOSPITAL CARDIAC ARREST ROSC RATES

Colby Redfield, Stephen Suarez, Jessica Daniels, Cristina Wilchek, Heidi Siples, Kim Landry, Leon County EMS Category of Submission: Cardiac

Background: The prevailing standard of care in prehospital emergency medical services is that either intravenous (IV) or intraosseous (IO) are acceptable routes for obtaining vascular access and delivery of resuscitation medications and volume administration. Our local EMS agency’s current cardiac arrest protocol allows for either IV or IO access to be placed without a documented team leader present: To evaluate the effectiveness of IV access versus IO access, in terms of Return of Spontaneous Circulation (ROSC), as well as survival, lactic acid values, and venous or arterial blood gas results in the emergency department (ED). We also recorded rates of ROSC and survival at 24 hours, 30 days, and 90 days. Results: Of 140 patients who received MCPR, valid data were available for 126 patients. Of included patients, 84 (66.7%) had an ETI placed, and 42 (33.3%) had a SGA placed. Twenty-eight (22.6%) achieved ROSC. In-hospital data were available for 13 (10.3%) patients. There were no group differences in etCO2 values during arrest, vital signs upon return of spontaneous circulation (ROSC), as well as vital signs, lactic acid values, and venous or arterial blood gas results in the emergency department (ED). We also recorded rates of ROSC or survival at 24 hours, 30 days, or 90 days. Conclusions: We detected no difference in markers of oxygenation, ventilation and perfusion and no difference for OHCA patient managed with either an ETI or SGA in combination with MCPR.

155. THE USE OF AIRWAY SIMULATION SCENARIOS TO AUGMENT SYSTEMIC QUALITY IMPROVEMENT INITIATIVES IN A FIRE-BASED EMS AGENCY

Eric Cortez, Tyler Smith, Andrew Little, Rich Latham, William Krebs, James Davis, David Keseg, Ohio Health Doctors Hospital Category of Submission: Operations, Quality, Safety, Systems, Disaster

Background: Airway simulation for prehospital providers has several benefits, including provider exposure to low-frequency procedures and identification of systemic quality improvement concerns. The objective of this study was to analyze two airway simulation scenarios during a routine paramedic airway course. We hypothesized that the simulation scenarios would identify areas of focus for future quality improvement initiatives. Methods: We conducted a retrospective evaluation of paramedics in an all advanced life support (ALS) fire-based emergency medical service (EMS) system during two simulated airway scenarios in a hospital-based simulation center. During each session,
teams of paramedics (4–6 individuals) managed one trauma patient and one acute decompen-sated heart failure patient. Trained EMS agencies reported using capnography and confusion and bronchoscopy as a standard scoring sheet with predefined data points evaluated teams. The primary objective of this study was to analyze patients that received naloxone by EMS providers. We hypothesized that a proportion of prehospi-tal patients were administered naloxone in the absence of apnea. Methods: This was a retrospective study of patients that received prehospital naloxone between October 1, 2015 and March 31, 2016. All patients admininistered naloxone and transported to emergency departments (EDs) within the study’s health-care system were included. Patients were excluded if they were transported to EDs outside of the healthcare system. The primary outcome was the presence of prehospital apnea before naloxone administration. Secondary outcomes included the proportion of patients diagnosed with opioid overdose in the ED, and the presence of prehospital unresponsiveness, morbidly, and hypoxia (< 94% pulse oximetry). Data points were defined as a priors and a standardization of a data set of patients. Data were reported as percentages, and medians with interquartile ranges (IQR). Results: A total of 315 patients were included. The median age was 45 years (IQR 31–56), and 61% were males. The most common naloxone doses were 2 mg (54%), 4 mg (26%), and 6 mg (7.2%). Of 347 patients with available prehospital physical examination findings, apnea was present in 27%, unresponsiveness in 56%, morbidly in 51%, and hypoxia in 17%. Final ED diagnosis was available for 264 patients, and 128 (45%) were diagnosed with opioid overdose. Conclusions: In this study, a proportion of EMS patients received naloxone in the absence of apnea and other signs of opioid toxicity. Furthermore, over half of the patients were not diagnosed with opioid overdose in the ED. This data highlights several important considerations for EMS naloxone administration: indications (obvious opioid toxicity vs. undifferentiated overdose), endpoints of therapy (reversal of apnea vs. confusion), need for re-dosing (potent opioid toxicity vs. non-opioid overdose with partial response), and the need for naloxone administration in the setting of medical or traumatic emergencies. Limitations include a high number of missing ED diagnoses, and exclusion of patients transported to other hospitals.

160. Can Crip Technique and Bag Size Improve Volume Delivered with a Bag-Valve-Mask by EMS Providers?

Melissa Kroll, Jyotirnoy Das, Jeffrey Siel-ger, Washington University Barnes-Jewish Hospita! Category of Submission: Medical

Background: Emergency Medical Services (EMS) professionals rely on the bag-valve-mask (BVM) to provide life-saving positive pressure ventilation in the prehospital setting. Multiple emergency medicine and critical care studies have shown that lung-protective ventilation protocols reduce mortality and mortality. A recent study has shown that the volume typically delivered by EMS professionals with the adult BVM are often higher than recommended by lung-protective ventilation protocols. The primary objective was to determine if a group of EMS professionals could reduce the volume delivered by adjusting the BVM size held. Secondary objectives included (1) if the
adjusted grip allowed for volumes more consistent with lung-protection ventilation strategies and (2) comparing volumes to similar grip strategies across a smaller BVM. Methods: A patient simulator of a head and thorax was used to record respiratory rate, tidal volume, peak pressure, and minute volume delivered by participants for 1 minute each across six different scenarios: three different grips (using the thumb and fingers, two fingers or one finger) with two different sized BVMs (adult and pediatric). Trials were randomized by blindly selecting a paper with the scenario listed. A convenience sample of EMS providers was used based on EMS provider and research staff availability. Results: We enrolled 50 providers from a large, busy, urban hospital-based EMS agency a mean 8.60 (SD 0.03) years of experience. Median volumes for each scenario were 836.0mL, 834.5mL, 794.0mL for the adult BVM (p < 0.003) and 576.0mL, 571.5mL, 547.0mL for the pediatric BVM (p < 0.001). Across all grips, the pediatric BVM provided more breaths within the recommended volume range for a 70kg patient (46.4% vs 4.4%; p < 0.001) but only 1.1% of breaths below the recommended tidal volume. Conclusions: The study suggests that it is possible to alter the volume range for the BVM by altering the grip on the BVM. The tidal volumes recorded with the pediatric BVM were more consistent with lung-protective ventilation volumes.

161. RETROSPECTIVE REFINEMENT AND VALIDATION OF A HYPOGLYCEMIA DECISION TOOL FOR PARAMEDICS

Julie Sinclair, Michael Austin, Shannon Ledoux, Zachary Carter, Richard Dionne, Penny Price, Justin Maloney, Andrew Reed, Andrew Willmore, Valerie Charbonneau, Christian Vaillancourt, Regional Paramedic Program for Eastern Ontario CATEGORY OF SUBMISSION: MEDICAL

Background: Hypoglycemia symptoms are often treated by paramedics in the prehospital setting. There are several medications plus race, history of previous encounter, is an independent predictor of future healthcare utilization within 90 days after the emergency department visit. Participants were enrolled via three pathways: 1-1 activation for lift assist, ED visit, or self-referral. Participants completed home visits by research paramedics, who assessed home safety and 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 health records. A multivariate analysis was performed, including several of the research paramedics’ assessments plus race, sex, medication count, history of prior healthcare utilization, and enrollment pathway with the dependent variable being ED or hospital admission within 90 days. Results: Of 2,224 participants, 1,512 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. 395 (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 ED or 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-adopted fall risk inventory is a simple tool for paramedics to enhance the EMS assessment of patients at risk. Future research is needed to prospectively validate the tool and evaluate its impact on prehospital and healthcare systems.

162. FALL RISK INVENTORY BY PARAMEDICS PREDICTS FUTURE HOSPITALIZATION AND ED UTILIZATION BY ELDERLY

Ryan Carter, Joanne McGovern, James Dziura, Fangyong Li, Geling 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” were admitted; 34 (8.7%) had repeat access to paramedics/ED care, 247 (63.0%) were transported to hospital and 57 (14.5%) were admitted; 60 (15.3%) patients met the revised hypoglycemia decision tool for non-transport. Of these, 8.3% were transported to hospital and all were discharged with POHCA ED with no additional management for hypoglycemia; 6.7% had repeat access to paramedics ED care for hypoglycemia none were admitted. The sensitivity of the hypoglycemia decision tool was 93.3%, specificity 17.8%, PPV 25.0%, NPV 90.0% demonstrating high sensitivity and NPV, this tool is potentially safe to rule out transport to hospital following paramedic care for prehospital hypoglycemia. Further research is needed to prospectively validate the tool and evaluate its impact on prehospital and healthcare systems.

Paul Banerjee, Paul Pepe, Ammnder Singh, Latha Ganti, Fork County Fire Rescue CATEGORY OF SUBMISSION: PEDICATRIC

Background: To determine which factors had the strongest association with 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 a large EMS urban/suburban jurisdiction that uses a comprehensive Utstein-style database, all POHCA cases encountered over a calendar year (January 1, 2012 through December 31, 2016) were analyzed for associated outcome correlations following full implementa- tion of the latest (2010) international guide- lines for childhood basic and advanced life sup- port. The analysis was used to identify current predictors for return of spontaneous circula- tion (ROSC), hospital admission (HA) and sur- vival to successful hospital discharge (SURV). Logistic regression models of traditional predictors were used. Results: Of 133 consecutive POHCA cases stud- ied, the interquartile range for the median ages was 16 to 47 years (range: 0– 490) and the majority presented with asytole. As traditionally predicted, bystanders from arrest to EMS arrival were associated (sig- nificantly) with ROSC, HA and SURV (all p < 0.0001) whereas bystander arrests (cases only 13%) were not (p = NS). Still, in 95% of cases, the arrest was identified by a bystander prior to EMS arrival and, contrary to previous studies (with lower reported fre- quencies of bystander CPR), chest compres- sions were performed by bystanders in 59% of cases. The earlier CPR was performed by an EMS personnel itself was (significantly) associated with ROSC, HA and SURV (all 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 contribut- ing factors in this subpopulation of cardiac arrests (likely reflecting infrequent ventricular dysrhythmia etiologies), as expected, shorter elapsed times from the moment of arrest to EMS arrival; performance of CPR prior to EMS arrival; and, most importantly, any treatment provided before EMS arrival were signifi- cantly higher rates of ROSC, hospital admis- sion 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: PEDICATRIC

Background: The aim of this study is to quanti- tatively evaluate adherence to 2015 AHA guide- lines for quality CPR during the transition of patient care from EMS to ED. We hypothe- sized that quality would be compromised dur- ing this complicated period as evidenced by pauses in chest compressions. Methods: We simulated the handoff and resuscitation of a pediatric patient in a tertiary pediatric ED using EMS and hospital volunteers. This was a pilot study conducted over two, four hour sessions, where as many simulations as possible were run. Simulation was done at the prehospital gurney in the ER hallway and continued through first 10 seconds of ded- icated compressions from ER staff. Data were collected from the ER staff’s gurney in the ED and collected from the ER staff’s gurney in the ED.
Qualitative assessment was performed using video recording and post-simulation participant surveys. The primary outcome was number of pupils in chest compression longer than 10 seconds. Secondary outcomes include analysis of depth and rate of compressions and qualitative feedback from participants about potential for errors. Results: A total of 16 simulated resuscitations were analyzed, with a total of 16 minutes of CPR. Only two simulations each had a total of one pause longer than 10 seconds. Average depth of compressions ranged from 107-146 mm, with the majority of compressions being above 120 mm. Conclusions: Simulated CPR during EMS to ED handoff did not have an issue with prolonged duration. However, the majority of the resuscitation did not meet quality goals/2015 Pediatric BLS Guidelines. Limitations include that this was a simulated resuscitation scenario and only one size mannequin was used. More studies observing real-time resuscitation should evaluate the validity of this pilot study findings to possibly guide efforts to improve resuscitation quality.

165. Factors Associated with Pediatric Interfacility Transfer from Emergency Departments
Ali Aledalm, Jon Mark Hirschon, Jennifer Fishe, Jennifer Anders, University of Maryland Department of Emergency Medicine Category of Submission: Pediatric

Background: In regionalized health systems, pediatric patients often require interfacility transfer (IFT) from an initial emergency care to a second acute care facility to reach definitive care. Pediatric patients require delays in definitive care, and increased cost. EMS triage tools to guide pediatric destination choice should be developed to reduce the need for IFT. Objective: To determine factors associated with the likelihood of pediatric ED patients undergoing Interfacility Transfer (IFT). Methods: This study utilized ED data from 2010-2012 of Maryland HCUP ED visit data. We included patients 0-17 years of age with a discharge destination of interfacility transfer. The analysis was limited to visits classified as “emergent” and the 20 most common Diagnosis Categories (DCx) associated with IFT. Factors assessed included: DCx, age, gender, race, and insurance type. The likelihood of IFT from the ED was evaluated by weighted linear logistic regression modeling design. Results: For the three-year period, 146,995 pediatric ED patients were diagnosed with one of the top 20 DCx emergent conditions; 10,143 underwent IFT. All factors assessed were statistically significant with varying effect sizes. The largest difference was seen between the top 20 DCx (medical [11.3% IFT] vs. trauma conditions [3.2% IFT], p < 0.001). Age was associated with incremental increases in transfer rate. Compared to 0-4 yo, the ORs of IFT were 1.35, 2.48, and 3.54 for 5-9 yo, 10-14 yo, and 15-17 yo, respectively (p < 0.001). In the adjusted logistic model, pediatric patients with medical conditions were 4.6 (4.41-4.85) times more likely to be transferred than patients with trauma conditions (p < 0.001). African-Americans were 22% less likely to undergo IFT than Caucasians. Private insurance and self-pay had a higher OR than Medicaid, 1.08 (p = 0.002), and 1.51 (p < 0.001), respectively. Conclusions: For pediatric medical patients, IFT from ED to another acute facility for admission is more common for trauma. EMS triage tools to guide destination choice for pediatric medi- cal patients may help reduce this discrepancy. Additional studies on race and insurance disparities exist for pediatric IFT from EDs.

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 Category of Submission: Student, Resident, Fellow

Background: Focused point of care cardiac ultrasound (FOCUS) has been used successfully in screening for 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 per- ceptions. The goal of this study was to evalu- ate 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 fire-based paramedics were recruited. The paramedics attended a 60 minute ultrasound lecture and practicum. An emergency medicine trained physician educated basics of ultrasound skills delivered the educational intervention to the paramedics. The paramedics completed a 5 question survey both before and after the educa- tion, regarding their perceptions of prehos- pital ultrasound. A Chi-square test or Fischer Exact test was used to determine statistical sig- nificance. Results: All 27 (100%) paramedics completed the pre-survey, education interven- tion, and the post-survey. Pre-survey only 2 of 27 paramedics felt they had a significant knowl- edge regarding FOCUS, while in the post- survey that number increased to 13 of 27, p < 0.001. Pre-survey 4 of 27 paramedics felt com- fortable performing and reading a FOCUS dur- ing a cardiac arrest compared to 23 of 27 post- survey, p < 0.001. Pre-survey 8 of 27 paramedics agreed that the cost of FOCUS justi- fies the benefit as compared to 21 of 27 post-survey. OR = 8.3, 95% CI: 2.4-28.4. Almost half (13 of 27) of the paramedics thought that FOCUS performed by paramedics during cardiac arrest would be easy to perform based on the pre-survey, com- pared to 24 of 27 on the post-survey, OR = 8.6, 95% CI: 2.5-31.4. Conclusion: The majority of paramedics (19 of 27) already believed that they should have access to prehospital ultra- sound, and in the post-survey that number increased to 25 of 27, p < 0.08. Conclusions: This study suggests that without previous edu- cation paramedics were not comfortable using FOCUS, but none looking at their per- ceptions. The goal of this study was to evalu- ate paramedics’ perceptions of FOCUS before and after an educational intervention. The analysis 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 fire-based paramedics were recruited for this study. The paramedics completed a 60-minute educational intervention on FOCUS which included a lecture followed by a hands-on session concentrated on using the parasternal long axis and subxiphoid views only. An emer- gency medicine trained physician delivered the educational intervention to the paramedics. The paramedics were given a brief overview of training of ultrasound knoleogy, and then asked to perform FOCUS using only the parasternal long axis and subxiphoid views. Participants were then graded using the Car- diac Ultrasound Structural Assessment Scale (CUSAS). CUSAS is a 6-point graded scale that evaluates visualization of the cardiac structure. A CUSAS score of 6 is given when multiple chambers are visualized. A CUSAS score of 3 is given when there is only partial visualization of the ventricle. A CUSAS score of 1 is given when no chambers are visualized. Results: 27 paramedics were able to view the heart during the practicum. When performing the parasternal long axis view 27 of 27 paramedics (100%) received a CUSAS score of 6 (multi- ple chambers visualized). In contrast, when performing the subxiphoid view 20 of 27 (74%) received a CUSAS score of 4 (multiple partial chambers including one ven- tricle) and 22 of 27 (81%) paramedics received a CUSAS score of 3. Conclusions: Our pilot study suggests paramedics with only limited education can be taught to successfully perform a FOCUS using the parasternal axis, but have difficulty using the subxiphoid view. Conclusions: Our pilot study suggests paramedics with only limited education can be taught to successfully perform a FOCUS using the parasternal axis, but have difficulty using the subxiphoid view.

168. Increasing Cardiac Arrest Survival through a Novel Dispatcher CPR Instruction Program
Brittany Farrell, E. Brooke Lerner, M. Riccardo Colella, Kenneth Sterng, Lesley Simley, Christine Westphal, Christine Cody, Medical College of Wisconsin Category of Submission: Cardiac

Background: Out-of-hospital cardiac arrest (OHCA) survival rates remain low as do bystander CPR rates. The MKE Health Care System provides CPR instructions to a bystander who performs compressions the odds of survival increase. However, many communities do not provide this lifesaving intervention, often citing the barriers of limited personnel and funding. Objective: To compare the implementa- tion of a novel centralized dispatcher CPR instruction program that serves seven PSAPs in a single county and compare bystander CPR rates before and after implementation. Methods: As of April 22, 2016, seven munic- ipal public safety answering points (PSAPs) that did not previously provide dispatcher instructions implemented this novel program. Using a simple 30-minute self-directed video, 84 PSAP dispatchers were trained to utilize a two-question protocol to identify and transfer suspected OHCA cases to a central communication center. At this center, a trained dispatcher delivered CPR instructions to the caller. Training of the 26 central com- municators was accomplished with a 2-hour in-person didactic session followed by a 2-hour practice session. We compared pre and post countywide EMS medical record data through December 2016 using descriptive statistics. We also collected and analyzed data from record- ings of communicator-to-caller interactions. Results: 169 calls were reviewed of the central dispatch center. Of those, 106 needed CPR instructions. Of those, 56 callers performed compressions before EMS arrival, 3 non-OHCA calls were for a variety of ailments ranging from severe to mild and the number
of non-OHCA calls decreased over time (May 44%; Dec 29%). 11 victims survived to hospital discharge, for a 19% survival rate; previously, the countywide survival rate was 10%. The countywide bystander CPR rate increased from 1% to 24%. Approximately 109 OHCA calls were transferred for instructions, work continues to increase the rate of OHCA calls transferred. Conclusions: Implementing a pre hospital protocol program improved 11% leading to increased the rate of bystander CPR. Using a central communication center for instructions allowed us to train and maintain a smaller group of communicators, leading to less cost and more experience for those communicators, while limiting the burden on the PPSAP dispatchers.

169. Qualitative Study of Emergency Medical Technician and Patient Perspectives on the Transport PLUS Program

Hayley Neher, Ksenia Gorbenko, Nadir Tao

Background: “Transport PLUS” is an education program in which Emergency Medical Technicians (EMTs) are trained to use a checklist to perform discharge instruction comprehension assessments and home 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 those factors that are associated with promoting better visually appealing, easier to understand, and enhance comprehension. Suggested improvements included emphasis on situational awareness. We found a high degree of agreement between the two groups in identifying barriers to success and more experience for those communicators, while limiting the burden on the PPSAP dispatchers.

170. Am I Awake? Lack of Sedation for Intubated Patients during Transport in Statewide Treatment Protocols

Christina Loporcaro, Beth Schoenfeld, et al.

Methods: Cross sectional study of STPs, utilizing a standardized review to evaluate sedation protocols for intubated patients and the use of sedation assessment score tools. Protocol revision date was also captured. Results: Thirty-one 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 incorporates guidelines for the use of sedation to improve patient outcomes and reduce complications. The majority of states issue STPs, utilizing a standardized review to evaluate sedation protocols for intubated patients. In the future, we hope to develop 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 Prehospital Naloxone: A Retrospective Chart Review

Thomas Dykstra, Jennifer Knapp, Patrick Dugan, Rhianes Nickel, City of Kent Wayne, EMS Foundation Chair Category of Submission: Student, Resident, Fellow

Background: A significant proportion of patients responded to by EMS personnel for opioid overdose were subsequently treated for opioid abuse after treatment and resuscitation, leading to multiple encounters involving the administration of Naloxone to patients experiencing respiratory depression secondary to opioids. This study is designed to identify the prevalence of recurring encounters that require the administration of Naloxone to intubated 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.
epidemic, STPs have not fully incorporated alternatives to opiates for pain control. This represents a significant opportunity to improve our STPs and evaluate alternatives to narcotic medication for the management of pain, and do our small part to help combat the opioid epidemic. Further study is needed to better understand the barriers to adoption of non-opioid pharmacologic treatment or adjuncts for pain treatment.

173. The Heavy Lift: Impact of a Regional Bariatric Transport System

Gerald Wydro, Larry Loose, Alvin Wang, Department of Emergency Medicine, Aria Jefferson Health Category of Submission: Operations, Quality, Safety Systems, Disaster

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 reported 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 in our suburban EMS system served by 17 agencies 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 EMS unit and assist with transport of the patient and crew to the hospital.

Results: There were 121 requests for BSU transport 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 system more than once. Average on-scene time increased by 150% for patients transported via BSU (30 minutes) compared to our system average on-scene time (12 minutes). Patient and EMS crew satisfaction was high with the BSU system as there were no reported complaints 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 practitioners used unconventional modes of transportation for transporting a patient to the hospital during this period; 20% of patients utilized the system more than once. On-scene times were 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 (OHCA) – The Design for STPs in EFAC Measurement

Patrick Chow-In Ko, Mei-Fen Yang, Kab-Meng Chong, Hui-Chih Wang, Chien-Hsin Lu, Chih-Hao Lin, Yen-Bing Chen, Wen-Long Chen, Ming-Shian Lee, Wei-Ching Chong, Chih-Chang 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 CPR rate after OHCA. Registry of quality measurement of DACPR has never been explored. We designed a nationwide quality registry for DACPR performance and innovations using online e-registry for performance measurement.

Methods: A nationwide Google Forms based online e-registry system covering over twenty administrative regions and over nine million population was designed and launched for DACPR performance and quality measurement at individual case level for non-traumatic OHCA patient. Audio records of individual EMS call were reviewed for performance rating. System data inputted could be immediately retrieved as feedback to each corresponding administrative region. Recognition of cardiac arrest by call communication, CPR Instructions upon the recognized OHCA, and chest compression upon the recognized OHCA were the three major categorical performance indicators, and each operating time interval of call-to-recognition, call-to-instruction, and call-to-compression were evaluated. Each categorical performance indicator (Y-axis) was paired with its operational time interval (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 6,078 audio records for OHCA EMS calls across 18 regions were centralized into the nationwide DACPR Quality Registry in 6 months (minimal 40 to maximal 1,625 cases/region according to its 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 77) seconds. The designated diagrammatic comparisons may indicate the administrative regions of better performance located at the upward and leftward dimension, and the ones of unsatisfactory 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 needed 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 Ingeber, Meghan Lamp, Kathleen Berns, David Claypool, Mayo Clinic Category of Submission: Medical

Background: Despite improved portability and ease of cannulation, few research on prehospital transport services currently transfer patients on ECMO. The purpose of the current study was to perform a descriptive cohort study of patients transported via air or ground while on ECMO. Methods: Retrospective case series of patients transferred via air and ground were reviewed during a single critical care transport provider to a single tertiary care facility between January 1, 2014 and May 31, 2017. Patients were included if transported while on ECMO. T-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 1-68 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 by 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 cardiac shock (28%). Four patients received ECMO as extracorporeal life support (ECLS) for refractory cardiac arrest. No patient died during 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 frequent complications in transit were sedation, muscle relaxation, and heparinization. Survival to hospital was 48%, while survival amongst youngest patients (p = 0.52). Mortality for patients on VA-ECMO was 62.5%, compared to the binder group; six (42.9%) had pelvic fracture diagnoses compared to four (25.0%) in the comparison group. The patient population was majority male (9) and averaged 31.5 years. Of the twenty-three patients (74.2%) admitted to the hospital, 11 (47.8%) were admitted to the ICU. Only 3 (9.6%) patients required angioplasty, 2 (6.5%) surgical control of bleeding, and 3 (9.6%) a transfusion. One (3.2%) patient required readmission and died within 30 days. There were no serious adverse events.

Conclusions: This pilot test demonstrates that prehospital providers are able to implement a randomized trial, including identification of eligible patients, maintaining the randomization scheme and assessment to determine performance and to clinical and research teams at the receiving hospital.
with 33.3% for those on VY-ECMO (p = 0.35). In patients receiving ECLS, 50% survived to discharge; both had refractory VF/VT arrests. Non-ECMO survival was noted based upon early (40%) versus late (50%, p = 0.70) ECMO initiation. **Conclusions:** In our patient cohort, ECMO use for VY-ECMO was associated with significant adverse event or mortality. VA ECMO for cardiopulmonary support was associated with better survival compared to comparatively short-term ECMO operations. In our patient group, ECMO survival was noted as 33.5% (versus non-users) refused (41.6% vs. 14.1%, p < 0.039). Ambulance use was associated with a higher proportion of ambulance users (66.5% (of the sample (33.5%,

**Method:** This retrospective study encompassed all transport data for patients transported to the closest facility. Positive mLAPSS and EMS notifications 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 activations and coronary intervention were significantly higher in patients with an ED physician interpretation of ST-elevation compared to those with LBBB (71% vs. 9%, OR 22.03, CI 9.77–49.68, p < 0.0001). One patient with LBBB received emergent cath with stenting after testing revealed elevated troponin. Secondary analysis of this patient’s EKG showed that he did not have RBBB criteria. Conclusion: The majority of EMS STEMI alerts did not require emergent cardiac catheterization. More false positive alerts were due to nondiagnostic EKGs rather than LBBB. It appears that removal of LBBB as criteria for STEMI activation can safely lower STEMI alert numbers. Future protocols will direct EMS to transport patients with LBBB and anginal symptoms to a PCI-capable center without designating the patient as a STEMI alert. Further efforts to avoid increasing the number of false positive alerts through EM education.

180. IS DOOR-TO-NEEDLE TIME REDUCED FOR EMS TRANSPORTED STROKE PATIENTS ROUTED DIRECTLY TO THE CT SCANNER ON ED ARRIVAL?

**Bryan Sloane, Nicole Bossom, Jeffrey Saver, Nerses Samsonian, Marianne Gausche-Hill, Harbor-UCLA Medical Center CATEGORY OF SUBMISSION: MEDICAL**

**Background:** To evaluate if a protocol to route EMS-transported stroke patients directly to the CT scanner on ED arrival reduces door-to-needle time (DTN). We hypothesized a reduced DTN compared to initial routing to an ED bed. Methods: This is a retrospective analysis of a large regionalized stroke system. EMS utilize the modified Los Angeles Prehospital Stroke Screen (mLAPS) and transport all suspected acute stroke patients to one of 46 Approved Stroke Centers (ASC). Some ASC route EMS directly to CT. ASC report patient treatment and outcomes to a registry, from which data were abstracted from May 2015 through April 2016. Adult patients transported by EMS and treated with intravenous thrombolytic therapy (IV tPA) were included. The primary outcome was median DTN at hospitals with CT routing protocols compared to hospitals with ED routing. Secondary outcomes were door-to-imaging time, hospital length of stay, and modified Rankin Scale (mRS) at discharge. A subgroup analysis of patients with positive mLAPSS was planned a priori. Outcomes were compared with Hodges-Lehmann (HL) and Wilcoxon Rank-Sum (WRS) tests for difference. Results: EMS transported 6315 patients for suspected stroke and 797 (13%) were treated with IV tPA at hospitals with CT routing and 654 at hospitals with ED routing. Patient characteristics were similar between groups; overall 420 (55%) were male, 500 (62%) White race, and 189 (24%) Hispanic ethnicity. Median NIHSS was 12 (IQR 8–19) in the CT routing group and 11 (IQR 5–19) in the ED routing group. Both mLAPS and EMS notifi-
cation occurred respectively in 63% and 96% in the CT routing group and 66% and 96% in the ED routing group. DTN was not different between the BMI groups, median DTN 55 minutes (IQR 45–78) for CT routing and 54 (IQR 40–73) for ED routing, median difference 4.5 (IQR 0–9), p = 0.009. There were no differences in the groups in terms of secondary outcomes or within the mAPSS-positive subgroup. Conclusion: This regional stroke system guidelines with protocols for routing EMS-transported stroke patients directly to CT did not have reduced DTN compared to hospitals without such protocols. These results are limited by the fact that the actual routing of each patient is not known.

181. Withdrawing

182. Association between BMI and Prehospital Selection of Advanced Airway in Out-of-Hospital Cardiac Arrest

Caitlin Howard, David Vamplew, Jeremy Allen, Hattie McAiney, Justin Smith, David Miramontes, Joan Polk, United States Army and JTFSCSA Category of Submission: Student, Resident, Fellow

Background: Obesity is associated with difficulty prehospital endotracheal intubation. The objective of this study was to examine the association between patient BMI and the selection of advanced airway by prehospital providers during out-of-hospital cardiac arrest (OHCA).

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. Advanced airway selection was at the discretion of the resuscitation team. BMI was a subjective measurement obtained from the paramedics at the time of data collection. Data was analyzed from January 1, 2016 through August 15, 2016. Patients were included in the study if the following variables were available: age, gender, BMI, and initial airway attempted (supraglottic vs ET). Patients were excluded if age < 17, no gender, or BMI recorded, or an airway other than supraglottic or ET was used. Patients were divided into 4 groups based on the BMI (under, normal, over, morbid). A subgroup analysis of endotracheal intubation method (direct laryngoscopy (DL) vs video laryngoscopy (VL)) was also examined. We calculated the rate of endotracheal intubation for each BMI group (P = 0.80). Conclusions: We found that paramedics tended to favor endotracheal intubation with lower BMI patients. There was no difference noted between BMI and DL vs VL. Limitations included that the BMI was not calculated and we only looked at the initial airway attempt, which may not have been the conclusive airway.

183. Development of Modified Trauma and Injury Severity Score Model to Predict Disability for Acute Trauma Patients

Ki Jeong Hong, Sang Do Shin, Kyung Jun Song, Young Sun Ro, So Yeong Kong, Tae Han Kim, Jeong Ho Park, Department of Emergency Medicine, Seoul National University Boramae Medical Center Category of Submission: Trauma

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 was recognized 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 on the TRISS-D model for functional outcome like severe disability and worsening disability using age, diagnosis, Goals of Care Designation (GCD), and Canadian Triage Acute Score (CTAS) score. Objectives: This study will provide an analysis of various ECCURT patient characteristics, and determine whether a statistically significant correlation exists comparing age, GCD and CTAS score with transport frequency. Results: A total of 471 emergency medical services (EMS) continuing care urgent response team (ECCURT) to support continuing care residents by providing urgent care, thereby reducing unnecessary patient transfers to emergency departments. ECCURT is comprised of Advanced Care Paramedics and Nurse Practitioners, and is dispatched via a dedicated consult line and/or 9-1-1. Various patient characteristics are tracked within an electronic database including age, diagnosis, Goals of Care Designation (GCD), and Canadian Triage Acute Score (CTAS) score. Objectives: to predict Disability (TRISS-D) for acute trauma patients.

Methods: We used emergency medical services based on the TRISS-D model for functional outcome like severe disability and worsening disability using age, diagnosis, Goals of Care Designation (GCD), and Canadian Triage Acute Score (CTAS) score. Objectives: This study will provide an analysis of various ECCURT patient characteristics, and determine whether a statistically significant correlation exists comparing age, GCD and CTAS score with transport frequency. Results: A total of 471 emergency medical services (EMS) continuing care urgent response team (ECCURT) to support continuing care residents by providing urgent care, thereby reducing unnecessary patient transfers to emergency departments. ECCURT is comprised of Advanced Care Paramedics and Nurse Practitioners, and is dispatched via a dedicated consult line and/or 9-1-1. Various patient characteristics are tracked within an electronic database including age, diagnosis, Goals of Care Designation (GCD), and Canadian Triage Acute Score (CTAS) score. Objectives: to predict Disability (TRISS-D) for acute trauma patients.
correlated with transport frequency independently. GCD and CTAS score may be quite useful predictors for Community Care EMS Teams when selecting patients who can be managed on-site without transport to hospital.

186. EARLY DOUBLE SEQUENCE DEFIBRILLATION IMPROVES OUTCOMES IN REFRACTORY VENTRICULAR FIBRILLATION

Matthew Harris, Ronald Klebacher, Joshua Segal, Andrew Parrish, Michael Carr, Andrew Torres, Navin Ariyaprakai, Amunedi Tagore, Eric Wasserman, Bauter Robert, Mark Merlin, Newark Beth Israel Medical Center Category of Submission: CARDIAC

Background: Refractory ventricular fibrillation (RFV) has been defined as VF that persists after 5 standard attempts at defibrillation (SD), though no uniform definition exists. Its incidence has been estimated at 0.5–0.6 per 100,000 population. Double sequence defibrillation (DSD) has emerged as a possible treatment for RFV to improve rates of ROSC.

Methods: A retrospective chart review of patients greater than 17 years with VF, defined as SF persisting after 5 defibrillations (SD), after the implementation of a quality project allowing paramedics to perform DSD in patients with VF, after 3 SDs. Two sets of definition paddles were placed on the patients with RFV. Two rapid sequence defibrillations at 360 Joules were performed. No limit was placed on the number of DSD shocks provided. We compared patients who received SD to those who received DSD. Our primary outcome was ROSC. We performed descriptive statistics, and association and correlation between variables with ANOVA and Chi-squared. Results: We identified 280 patients with RFV. 229 (82%) received SD only and 51 (18%) received DSD. Comparing the SD group vs. DSD group: Mean Age 67.7 years vs. 66.8 years (p < 0.001), 14.7min vs 9.5 vs 14.7min ± 10.1), and in those who received DSD, mean time to first DSD was 33.6 minutes. The rate of ROSC was higher in the control arm compared to therapy arm, though this was not statistically significant (31.4% vs. 23.5%) (p value = 0.26). Of the 32/51 patients with ROSC in DSD arm, average time of 1st shock was the identical (14.7min ± 9.5 vs 14.7min ± 10.1), and in those who received SD, mean time to first DSD was 33.6 minutes. The rate 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. PEDIATRIC TRANSPORT: AN ANALYSIS OF THE INTERACTION BETWEEN EMERGENCY ROOM PHYSICIANS AND PARAMEDICS

Jason Pripic, Alicia Violin, Sylvie Michaud, Nicole Sykes, Paul Myre, Health Sciences North Centre for Prehospital Care Category of Submission: PEDIATRIC

Background: In Ontario, paramedics operate mainly under off-line medical direction, they use online medical control when it is mandatory according to provincial medical directives or if a patient presents with a condition that does not fit into their protocols. Literature that encompasses the interaction that occurs between online and offline paramedics is limited even though this interaction is critical to ensure patients receive appropriate prehospital care. Objective: The objective was to describe the quality of online medical control in a Canadian EMS, 6,705 miles in the rural jurisdiction. HEMS use for pediatric transport was zero in the urban county, 0.1% in the suburban county and 4.8% in the rural county (p < 0.001). The mean transport time per patient varied significantly at 10.6, 15.2, and 21.6 minutes, respectively (p < 0.001). Mean road transport miles per pediatric citizen was 4.6, 13.0, and 31.3 miles, respectively (p < 0.001). On a population basis, EMS utilization for direct transport was 0.1, 0.49, and 0.445 minutes per pediatric citizen and 0.214, 0.716, and 0.386 road miles per pediatric citizen per year, respectively (p < 0.001). Conclusions: EMS resource use for pediatric transports is noteworthy and varies significantly between urban, suburban, and rural jurisdictions. This study provides essential benchmarks for future development of pediatric direct transport protocols.

189. ASSESSMENT OF EMERGENCY MEDICAL SERVICES PROVIDER RESEARCH LITERACY AND INVOLVEMENT

Lauren Maloney, Robert Marshall, Henry Thode Jr, Adam Singer, Scot Johnson, Stomp Brook University Department of Emergency Medicine Category of Submission: STUDENT, RESIDENT, FELLOW

Background: For a needs assessment for future continuing medical education classes and rollout of prehospital clinical research, a survey was developed to gather data on provider attitudes towards evidence-based medicine (EBM), participating in clinical research, and informed consent. Methods: A 35 question survey was distributed to a sample of a university-based EMS system. Studies included demographic and experience items. Responses to various statements were graded on a 5-point Likert scale from “strongly disagree” to “strongly agree” and analyzed with Chi square tests. Results: Of 54 analyzable surveys, 81.5% respondents were paramedics and 18.5% were EMT-Bs. 78% of respondents were male. Mean age was 39 with an average of 10 years of EMS experience. 61.3% stated medical degrees, 48% subscribed to medical journals, and read articles a couple times a week (20%), monthly (32%), or year (35%). At least 95% of providers agreed about the importance of prehospital EBM and their responsibility to stay current with medical advances. Paramedics were more likely than EMT-Bs to disagree that EMS protocols are updated promptly. 37% agree that patient care decisions should be based on research evidence and not personal experience, (45% males vs. 8% females). 65% of those surveyed disagreed with limiting the rights of an individual to better the care of a large group, and disagreement was higher in females than males (92% vs. 57%), respectively. A total of 96% agreed with access to read medical journals, articles for CME; those without a college degree were more likely to disagree. No significant relationship between gender, EMS experience, provider level, or experience existed with frequency of reading research articles. A total of 65% disagreed that spending an additional 5 minutes after a call to complete clinical trial paperwork would be a burden; those who read articles a couple times a week were more likely to agree. A total of 44% disagreed with enrolling a critical patient in a trial if delayed consent is obtained, with a significant relationship to age; younger responders were less likely to disagree than other age groups. Conclusions: In this cohort of prehospital personnel, evaluating medical involvement in future prehospital clinical trials was overall well received.
190. Can Heart Rate Variability Risk Stratify Patients with Undifferentiated Non-TRAUMATIC CHEST PAIN?
Juan March, Carmon Russoniello, Nicholas Murray, Walter Rush
East Carolina University Department of Emergency Medicine Division of EMS Category of Submission: Cardiac

Background: Previous research suggests that heart rate variability (HRV), also known as R to R variability, is used to risk stratify patients with known acute coronary syndromes. The HRV spectrum contains two major components. One component of HRV is the high frequency (0.15–0.40 Hz) component, which is synchronous with respiratory and is identical to respiratory sinus arrhythmia. The second is a low frequency (0.04–0.15 Hz) component, which appears to be mediated by both the vagus and cardiac sympathetic nerves. This study examined whether heart rate variability can be used to risk stratify patients presenting with undifferentiated non-traumatic chest pain. Methods: This exploratory study was performed at a teaching hospital with 900 beds and an Emergency Department (ED) with an annual census of 120,000. A convenience sample of adult patients presenting to the Emergency Department with a chief complaint of non-traumatic chest pain were enrolled. HRV was captured using a physiological status monitor (PSM) affixed to the chest for a 5–10 minute period during the patient’s ED stay. High risk patients were identified by either a positive troponin, positive stress test, positive cardiac catheterization, ST elevation on EKG, or death within 30 days. A low frequency/high frequency ratio of less than 1.0 was used as the cutoff. Data analysis was performed with a Fisher Exact test. Results: A total of 26 patients were enrolled. All six patients identified as high risk had a LF/HF ratio of less than 1.0; specificity = 100%, p = 0.001. Conclusions: This pilot study suggests that heart rate variability can be used by EMS to rapidly risk stratify patients presenting with undifferentiated non-traumatic chest pain. This pilot study suggests that heart rate variability can be used to 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 non-invasive EEG-based brain resuscitation index (EBRI) and evaluated correlation EBRI and end-tidal CO2(ETCO2). Methods: A crossover animal experiment study using porcine cardiac arrest model was designed. After 1 minute of untreated ventricular fibrillation, alternating 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 every 50 seconds in 10 cycles. 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 ETCO2 and EBRI. Results: Experiment was performed in five female pigs (44 ± 2.5 kg). ETCO2 and EBRI was obtained according to quality of CPR received. Delta EBRI obtained during high quality CPR was significantly higher than delta ETCO2 of low quality CPR (p = 0.04–0.30). ETCO2: Median – 0.18 (±0.05–0.32) vs. p = 0.01), EBRI had statistically moderate positive correlation with ETCO2 (r = 0.56). Conclusions: 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 Mink, Jonathan Kamrud, Jessica Jeruzal, Ruth Myerowitz, and Charles Lick, Andrew Stevens, Allina Health Emergency Medical Services Category of Submission: Professional
Background: To assess social connectedness and coping styles among emergency medical services (EMS) providers and explore their association with occupational burnout and perceived stress. Methods: A 167-item electronic survey was distributed to employees of a large ambulance service that provides 9-1-1 response in Minnesota. The survey included the Maslach Burnout Inventory (MBI), Cohen’s 4-item Perceived Stress Scale (PSS), the Brief COPE Inventory, and the Berkman-Syme Social Network Index (SNI). Burnout was defined as a high score on the emotional exhaustion (≥27) or depersonalization (≥15) subscales of the MBI. The COPE inventory assesses an individual’s tendency to use 14 coping styles in response to stress. The SNI characterized respondents as socially isolated, moderately integrated, and highly integrated. Results: 37% of participants reported emotional exhaustion, and 27% or more depersonalization. Decreased social connectedness was associated with increased burnout and were characterized as socially isolated were more likely to use instrumental support to cope were asso- ciated with a decrease of the rate of cardiac arrest after EMS contact for medical patients in the system from 12% to 9.1% (NS). Conclusions: The implementation of a “crashing” patient bundle of care resulted in a significant performance improvements in accomplishing key interventions for respira- tory distress patients. Patient care bundles may have significant utility to improve patient care and safety in the prehospital setting.

193. The Impact of the Implementation of a CRITICALLY ILL Patient Bundle of Care on the Performance of Key Medical Interventions for Respiratory Distress Patients by Paramedics in the Field
Mark Pinchalk, Mark Tomassi, Roth Ronald, Jeffery Reim Jr, James Dlutowski, Simon Tazel, Thomas Goode, City of Pittsburgh EMS Category of Submission: Submissions
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 effect of the implementation of a Prehospital “Crashing Patient” Critical Care Bundle on the performance of key prehospital intervention for patients presenting with respiratory distress. Methods: A “Crashing Patient” bundle of care addressing key interventions for critically ill patients was implemented in an urban Advanced Life Support (ALS) EMS system from 2012–2014. After full implementa- tion of the care bundle, retrospective Prehospital Care Report (PCR) review was conducted of PCRs with a chief complaint of “Respiratory Distress” for the first 10 months 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), vascular access and CPAP application were compared for all respiratory distress cases. For the subset of patients who received Albuterol for bronchospasm, the rates of administration of Methylprednisolone, Magnesium 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 ETCO2 monitoring from 32.6% to 45.9% (p < 0.001) of cases, ETO2 monitoring from 7.1% to 17.3% (p < 0.0001), vascular access 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 < 0.009) and 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 system from 12% to 9.1% (NS). Conclusions: The implementation of a “crashing” patient bundle of care resulted in a significant performance improvements in accomplishing key interventions for respira- tory 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 Protocols
Timothy Lynch, Carstine Fritz, David Schenkel, Beth Israel Deaconess Medical Center/ Harvard Medical School Category of Submission: Student, Resident, Fellow
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 admin- istration with contraindications such as history of seizures, or prolonged QT interval. Geri- atric dosing was reduced by 50%. The new protocol was implemented as a self-paced training module. The purpose of this investiga- tion is to describe the frequency and type of pro- tocol violations observed during the implementa- tion of a new protocol, with the goal of help-
Patients met the ETHAN criteria. Among this group of patients, traditional transport 15% (1947/Referred for EMS Transport to FSED/Total) and miscellaneous 8% (274/Patient Declined to speak with ETHAN MD, 130/Unable to Complete Due To Technical Issues, 84/Call for Home Care Instructions Only, 31/Patient Refused EMS Transportation, 120/Other). The mean study age was 44 years (range 1–99 years), 54% were female and no patient adverse events were reported. Conclusions: In this system’s population, telehealth alternate transport and/or destination dispositions significantly reduced low-acuity ambulance transports and ED visits. Further studies are warranted to develop guidelines for uniform implementation of prehospital care depositions based on the Physician telehealth model.

196. Novel Measure to Capture Transactional Stress in Paramedic Services

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

Background: In the past few years, there has been an increase in awareness of the challenge of managing work related stress in EMS. Extant research has identified different types of chronic and critical incident stress to stress reactions such as posttraumatic stress. However, there is no measure which captures the transactional stresses associated with interacting with allied professions (e.g., emergency department staff) or affiliated agencies (e.g., law enforcement). The purpose of this study was to develop and validate a measure which captured transactional stresses in paramedics.

Methods: An online survey was conducted with ten Canadian Paramedic Services with a 40% response rate (n = 717). Factor analysis was used to identify variance in responses related to the latent factor of transactional stress. The scale was validated using exploratory and confirmatory factor analyses. Results: The results of transactional stress questions was split to allow for multiple analyses (EFA n = 357). In the exploratory factor analysis, principal axis factoring with an oblique rotation revealed a two-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 = 130.39, df = 51, p < .001, 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. The factors, clearly aligned with transactional stress issues internal to the ambulance and transactional stress relationships external to the ambulance. Both subscales demonstrated good internal reliability (α = .843/α = .768) and were correlated (r = .01) with a convergent validity measure. Conclusions: This study successfully validated a two-factor scale which captures stress associated with the day-to-day operation of EMS and the interaction with allied professions. The development of this measure of transactional stresses further expands the potential that paramedics, Paramedic Service employees, and prehospital providers may understand the dynamics that influence provider health and safety. As a result, there may be potential 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, Brittany Farrell, M. Ricardo Coletta, Medical College of Wisconsin Category of SUBMISSION: OPERATIONS, QUALITY, SAFETY SYSTEMS, DISASTER

Background: Freestanding emergency departments (FSED) are an area of expansion in healthcare. Despite rapid and minimal amount of literature regarding the appropriate 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 by ambulance during a six month convenience period. A report was generated to abstract patient demographic, medical information, and possibly admission after initial treatment at a FSED. Data was analyzed using an unpaired t-test. Results: There were 138 patients brought to the FSED for the six month period of September 2016—February 2017 by 12 ambulance services. A total of 105 patients were discharged home directly from the FSED and 20 were transferred to a full-service hospital for admission or specialty care; 7 were admitted to a psychiatric facility; 6 were admitted to a skilled nursing facility. There was a statistically significant difference in age between patients discharged home and those transferred to a full-service hospital (52.69 years vs. 71.75 years; p = 0.001). There was no statistically significant difference between these two groups in initial FSED pulse rate, respiratory rate, systolic blood pressure, or temperature. There was a trend towards a longer length of stay in the FSED for patients transferred to a full-service hospital (183.5 min vs. 236.2 min; p = 0.0865). Conclusion: The data suggests older patients are more likely to require transfer and possibly admission after initial treatment at a FSED. The FSED initial visits were not good predictors of the need for transfer; the use of initial vital as a surrogate for prehospital vital is a limitation. Further research in a non-FSED based patient could yield further useful information to 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 cough (stridor). Methods: Publicly available protocols from 33 California LEMSA were itemized and reviewed in the following categories: wheezing, wheezing <24 months, and stridor. Descriptive statistics were used to compare these protocols. Literature reviews, including the American Academy of Pediatrics (AAP) current treatment guidelines, were used to create level of evidence (LOE)
tables for asthma, bronchiolitis, and cough. Of note, steroids were included only in the literature review, as California LEMSAs do not currently use steroids prehospital. The evidence-based tables were compared to California local EMS agency protocols. Results: Among the 33 LEMSAs that reported at least one year of prehospital use of each of the main treatments, the least amount of variability with only two of the six treatments, ipratropium (15/33) and nebulized epinephrine (3/33), having >2 LEM-
SAs with variability. The most common wheez-
ing 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 nonin-
vasive positive pressure ventilation (NIPPV) in the asthmatic child. Only three agencies dif-
f erentiated wheezing in children <1 year of age, referencing this as possible bronchioli-
tis. All three included albuterol and NIPPV as the core treatments but did not include nebulized hypertonic saline, nebulized epinephrine, steroids or suctioning. For chil-
dren <24 months, albuterol and steroids are no longer strongly recommended based on
new AAP guidelines. Stridor had the highest protocol variability, with no treatment having uniformity among agencies. The most com-
mon treatments included IV/IM epinephrine (24/33), NIPPV (29/33), and humidified mist (18/33). The least common treatments were nebulized epinephrine (12/33) and suctioning (4/33). For stridor, evidence supports the effi-
cacy of all formulations of epinephrine. Conclu-
sions: There is wide variation among California LEMSAs in their management of pediatric res-
piratory 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 MIH PROGRAM FOR 9-1-1 HIGH UTILIZERS
Jon Ehrenfeld, Ashley Clayton, Catherine Counts, Michael Sayre. Seattle Fire Department
department of emergency medical services (EMS) engagement, and reason for disenrollment when applicable. Groups were compared by chi-squared and t-tests. Results: Among 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. All were medical and socially complex, with a mean of >4 medical or social comorbidities per patient. Nineteen were assigned to DE and 26 to CC. In the baseline quarter the cohorts had a similar number of
responses (DE 9.5 ± 7.2, CC 8.4 ± 4.7, p = 0.54). More patients in the DE cohort received multidisciplinary care conferences (37% vs. 8%, p = 0.01), care coordination (55% vs. 15%, p = 0.008), while case management staff alone was more prevalent in the CC cohort (22% vs. 1%, p = 0.04). Quarterly EMS responses declined to 6 ± 5.7 after 3 months, 6.4 ± 6.6 after 6 months, and 5.9 ± 4.5 after 24 months. Clients in the third quarter averaged a six call decrease compared to baseline (1.8–10.2, p = 0.011). Nine were initiated, ongoing 9-1-1 utilization, and reason for disenrollment when applicable. Groups were compared by chi-squared and t-tests. Results: Among 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. All were medical and socially complex, with a mean of >4 medical or social comorbidities per patient. Nineteen were assigned to DE and 26 to CC. In the baseline quarter the cohorts had a similar number of

201. ASSOCIATION OF CASE VOLUME PER AMBULANCE STATION WITH OUTCOME OF OUT-OF-HOSPITAL CARDIAC ARREST (OHCA)
Tae Han Kim, Sang Do Shin, Kyung Jun Song, Ki Jeong Hong, Young Sun Ro, So Yeon Kong, Seoul National University Hospital, Depart-
ment of Emergency Medicine CATEGORY OF SUB-
MISSION: OPERATIONS, QUALITY, SAFETY SYST-
EMS, DISASTER
Background: Sufficient case volume for emer-
gency medical service may be important for
retention of resuscitation skills and proce-
dures during prehospital management of Out-
of-Hospital Cardiac Arrest (OHCA). We eval-
uated association of case volume per ambu-
lanse station with outcome of OHCA. Methods:
Nationwide data of all adult OHCA dur-
ing 2013 to 2014 was retrospectively analyzed.
All ambulance station were stratified in to 4 groups according to annual average number of
OHCA treated by EMS teams dispatched from
each ambulance station. Multivariable logistic
regression model was conducted to evaluate effect of increased case volume per an
ambulance station on survival outcome of OHCA.
Results: From 53,561 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 stations was 19.8 cases. Overall survival to discharge rate was 5.5% with 2.9% of discharge with favor-
able neurological outcome. Best-case scenario was in groups with largest case volume (7.2% in group 4(largest case volume) vs. 3.3% in group (smaller case volume)). Adjusted odds ratio of largest case volume per ambulance station for predicting survival was 1.4695% (CI 1.26 – 1.70). Conclusions: Case volume of OHCA per ambulance station might be associated to sur-
vival outcome of EMS treated OHCA. Appro-
priate prehospital EMS dispatching strategy according to case volume should be further studied.

202. RESOURCE UTILIZATION AND CLINICAL OUTCOMES OF OLDER ADULT EMS PATIENTS WITH TRAUMATIC BRAIN INJURY WHO WERE TRANSFERRED TO A LEVEL I TRAUMA CENTER
Courtney Jones, Vasishth Srinivasan, Jeremy Cushman, Julius Cheng, Timmy Li, Suzanne Gillespie, Martina Anto-Oczar, Nancy Wood, Heather Lenhardt, Ann Dozier, Jeffrey Bazar-
ian, Manish Shah, University of Rochester, School of Medicine and Dentistry CATEGORY OF SUB-
MISSION: TRAUMA
Background: Traumatic brain injury (TBI) is a
substantial source of death, disability, and
healthcare utilization among older adults. Older patients are frequently under-triaged by EMS to community hospitals and require subsequent transfer to a trauma center for further care. However, a minimal amount is known regarding the provision of care and patient outcomes at the final receiving hospital. We aimed to describe trauma care among geriatric transfer patients with TBI. Methods: We conducted a secondary analysis of a sub-cohort from a prospective multi-center study focusing on ambulance and emergency department (ED) care of injured older adults transported via ambulance. The current analysis focused on patients transferred to the region’s Level I trauma center from another hospital. The trauma center for the present study serves a 3-county catchment area of over one million people. Transfer paperwork from the originating hospital was reviewed and a detailed medical
record abstraction was conducted, including
computed tomography (CT) findings, procedures, lengths of stay (LOS), and ED disposition. We used descriptive statistics to characterize the study population, including proportions and confidence intervals. Results: There were 205 patients transported by EMS to a community hospital in Indiana, subsequently transferred to the Level I trauma center. Thirty had confirmed abnormalities on head CT (14.6%). The mean ages (range: 55–91) were 60% female, and the most frequent mechanism of injury was falls (93%). Median length of stay at the trauma center was 13.5 days (range: 0–230), with 8 patients staying one day or less. CT findings included subdural hematoma (60%), subarachnoid hemorrhage (50%), and intraparenchymal hemorrhage (36.7%). Five patients required neurosurgical intervention (17%), eight required ICU admission (27%), two were discharged from the ED (7%), and two transitioning to inpatient hospice (7%). Conclusions: In our sample, geriatric patients with TBI who were transferred to a trauma center were overwhelmingly injured via falls and had variable resource utilization and clinical outcomes. Additional ways for responding EMS providers to identify geriatric fall patients who are at high risk for TBI are warranted.

203. RELATIONSHIPS BETWEEN RIGHT ATRIAL AND AORTIC PRESSURES AND JUGULAR AND CAROTID FLOW RESPECTIVELY IN THE SIMULATION OF ASPHYXIAL PSEUDO-PULSELESS ELECTRICAL ACTIVITY

Norman Paradis, Karen Moodie, Sarah Crockett, Jeffrey Gould, Christopher Kaufman, Darn-Hui Li Medical Center Category of Submission: Cardiac

Background: The initial cardiac rhythms found during in-hospital respiratory arrests are typically either pulseless electrical activity (PEA) or asystole. Pseudo-PEA (P-PEA) is observed in 5% of cases. P-PEA 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 flows in the brain perfusion with a hypoaxial asphyxial model of P-PEA. Hypothesis: We hypothesized that during CPR right atrial pressure (RAP) would be related to carotid flow and that these relationships might change with time during P-PEA. Methods: Pseudo-PEA was induced via hypoaxial asphyxiation in 12 domestic swine (~32 kg) with standard physiological monitoring. 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. A target systolic blood pressure (SBP) of 40 mmHg was achieved in both groups. Results: Overall, RAP was significantly positively correlated with JVF (r = 0.51, p < 0.05), however, the relationship varied over time during P-PEA (Figure). AOP was significantly positively correlated 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 asphyxial model of P-PEA, venous blood pressures and flows were negatively associated and the relationship function of time. Arterial pressures and flow were positively associated 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.

204. CHANGE IN THE UTILIZATION OF EMERGENCY CARE AFTER ESTABLISHMENT OF EMERGENCY CENTRE IN YAOUNÉ, CAMEROON: A BEFORE AND AFTER CROSS-SECTIONAL ANALYSIS

So Yeon Kong, Sang Do Shin, Young Sun Ro, Yun Jeong Kim, Joong Sik Jeong, Dae Han Wi, Seoul National University Hospital Category of Submission: Medicinae

Background: In an effort to short the duration of emergency medical care in Cameroon, Yaoundé Medico-Surgical Emergency Centre (CURY) was established in June, 2015 in Yaoundé, Cameroon. To evaluate its impact on the communities of Yaoundé, we assessed the changes in utilization of emergency medical care since the establishment of CURY. Methods: In 2014 the first survey was conducted on randomly selected 619 households (3,358 individuals) living in six health districts of Yaoundé. In 2017 the second quantitative survey was conducted on 634 households (3,466 individuals) using the same study methods as the first survey. In both surveys, data on demographic information, socioeconomic status, and utilization of healthcare, including emergency care in the past year were collected on every member of the households via face-to-face interview. Data on two surveys were compared and emergency unit utilization by the distance from CURY was examined. Results: Participants in the both surveys had similar age and gender distribution with mean age of 24 and 54% being male. In 2014 survey, healthcare utilization rates for outpatient, emergency unit, and hospitalization were 37.2%, 4.3%, and 9.6%, respectively. In 2017 survey, corresponding rates were 32.4%, 5.7%, and 8.7%, respectively. The increase in the utilization of emergency unit between two surveys were statistically significantly (p=0.001). When the emergency unit utilization rates were examined by 3 km radius from CURY, there was decrease in the utilization of emergency care among residents living near CURY (27.3% in 2014 to 22.8% in 2017). Conclusions: After the establishment of emergency medical center (CURY) in Yaoundé, Cameroon, the utilization of emergency care was significantly increased. This increase was the results of the distance from the patients’ residential places to the emergency medical center, suggesting that the establishment of an emergency medical center may have impacted the utilization of emergency care throughout the entire communities of Yaoundé.

205. PREHOSPITAL PUSHDOSE EPIEINEPHRINE IN HYPOTENSION

Mark Merlin, Navin Ariyaprakai, Ammundep潮湿 Tabore, Matthew Harris, Newark Beth Israel Medical Center/RWJ Barnabas-MONOC Category of Submission: Medicinae

Background: Hypotension is commonly encountered in the prehospital arena and occurs with the presence of illness, trauma or may be iatrogenic during rapid sequence intubation (RSI). The mainstay of prehospital treatment has been empiric fluid administration; however, this method is not always effective. Push doses of epinephrine or phenylephrine, so called “push-dose prehospital,” have long been used by anesthesiologists for acute hypotension in the prehospital setting. However, “push-dose prehospital” has been used by anesthesiologists for 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 shock index (SI). We performed descriptive statistics on demographic, biometrics and derive the mean and standard deviations for continuous variables of both the interventional and control groups. 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 in the control group (P = 0.23). When comparing pre- and post-intubation vital signs of patients receiving PDE, we found significant decreases 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: These findings imply EMS use in the prehospital setting resulted in statistically significant improvements 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 receiving PDE. Readily available, easily composed and rapidly effective, PDE is a useful tool to combat acute hypotension in the prehospital and emergency care setting.

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 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 by 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 99.7% (95%CI 99.5–99.9). Conclusions: These findings imply EMS dispatch alone is not sufficient to rule-in stroke. In the case of MSUs, dispatch should be sent 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 interception by a MSU or transport to a stroke center and (2) EMS systems need triage tools to perform appropriate triage of non-stroke patients to such resources such as MSUs to ensure patient safety and to prevent delays in definitive care.