Central venous catheter (CVC) related bloodstream infections are a major cause of morbidity and mortality. This study determined the compliance rate with infection control guidelines for CVC insertion in the emergency department (ED).

Methods: A prospective observational cohort study was performed between November 2006 and March 2007 in a tertiary ED referral centre. Ethics approval was obtained. A standardized data collection form was completed by nurses assisting with the procedure. The primary outcome was the rate of compliance with current best practice infection control guidelines for CVC insertion. Analysis included descriptive statistics and chi-squared tests.

Results: There were 33 CVC insertions performed on 29 patients. CVC insertions were performed by staff physicians (30.3%) or residents (69.7%) from emergency medicine (45.5%), intensive care (45.5%) or medicine (9.0%). 42.4% of insertions were emergent and 54.5% of insertions were urgent. Ultrasound was used 42.4% of the time. The femoral vein, internal jugular vein, and subclavian vein were used 45.5%, 33.3% and 21.2% of the cases, respectively. The femoral vein was more likely to be used in emergent insertions (71.4%; p=0.01). All recommended infection control measures were used only 29.0% of the time, but only 15.4% of the time by emergency medicine personnel (p=0.05). The most common breaches were failure to cover the patient with a sterile gown (36%), to maintain a sterile field (15%), to use a sterile drape (12.1%), or to wear a hat (12.1%). Hand hygiene was performed before the procedure by 58% of operators and 57% of assistants. A mask was not worn in 6% of cases. There were no statistical differences in compliance with infection control between staff and residents, urgency of the procedure, or time of day.

Conclusions: There is poor compliance with infection control guidelines for CVC insertion in the ED. Further educational strategies are required to improve compliance with guidelines.
153 Lack of Compliance with Universal Precautions: Is There Truth In Advertising?
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Background: Use of universal precautions to protect health care workers from exposure and infection has been codified in hospital rules and by governmental agencies.

Objectives: The objective of this study was to quantify violations to universal precaution recommendations among photos posted on Accreditation Council for Graduate Medical Education (ACGME)-approved emergency medicine (EM) residency web sites.

Methods: Web sites of all ACGME-approved programs listed in the Society for Academic Emergency Medicine (SAEM) Residency Catalog in July 2007 were searched for photographs of health care workers involved in patient care activities. The photographs were analyzed by 2 investigators for the following: Is there potential for exposure to blood, body fluids containing visible blood, or other body fluids? If so, are all health care workers wearing the following: gloves, gowns, eyewear, and face-masks? Each violation on each person in the photo was considered a separate violation. The primary investigator reviewed a 20% sample of the sites for accuracy. Agreement between reviewers was calculated and frequency tables of violations were generated. This study was exempt from IRB review.

Results: 137 residency web sites were available for review. Two hundred photos depicting situations in which universal precautions should have been used were identified. Agreement among reviewers ranged from 80-90% for all variables. Sixty-two (45%) EM residency web sites portrayed violations of universal precaution recommendations. Twenty seven (20%) residency web sites posted more than one photo with violations. Violations were noted in 125 (63%) photos. Violations included: 21 (11% of photos) - no gloves, 84 (42% of photos) - no eye wear, 96 (48%) - no gown, 100 (50% of photos) - no mask.

Conclusions: Photos depicting violations of universal precaution recommendations are commonly posted on ACGME-accredited EM residency web sites. If there is truth in advertising, there is much room for improved adherence to universal precautions among EM residency programs.

155 Enzymatically-Augmented Subcutaneous Infusion (EASI)
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Background: In situations in which intravenous (IV) line placement is difficult or non-feasible, volume loading may be performed subcutaneously (SC) via hypodermoclysis. Hypodermoclysis is facilitated by SC administration of hyaluronidase, in enzymatically-augmented SC infusion (EASI).

Objectives: Compare EASI to IV infusion for: catheter placement and fluid infusion times, ease of use, and subject comfort.

Methods: In this unblinded, single-cohort trial, 20 healthy volunteers (55% male, median age 43) underwent IV placement with 20-gauge lines, placed by 4
Patient Attitudes towards the Use of the 911 EMS System

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Objectives: Individuals often use 911 for non-emergent conditions. Little research exists about patient beliefs regarding use of 911. This study examined how beliefs about 911 impact its use.

Methods: Cross-sectional survey of adult emergency department patients arriving at an urban adult trauma center across 6 weeks. Verbally administered survey assessed subjects’ 911 beliefs. Attending physicians were asked if the patient required emergency medical services (EMS). Logistic regressions assessed relations between these factors and 911 use. Results are presented as mean ± SD, and odds ratios with 95% CI.

Results: 206 patients enrolled. 48% arrived via 911, mean age 50±18 yrs, 55% female, 76% African-American, and 60% high school educated. 20% believed their condition was life-threatening, 69% serious, 11% non-serious. Believing one’s condition was life-threatening was related to 911 use (911 yes: 71% [58-84] vs 911 no: 29%[16-42]). No difference in 911 use was found among those believing they had a serious condition. Agreement between physician and patient judgment that 911 transport was needed was fair (Kappa=.44). Physicians felt 30% of those using 911 did so inappropriately, and 28% of those not using it should have. Overuse was related to being female (OR=2.9[1.4-7.2] and believing one will be seen more quickly (OR=1.5[1.1-2.1]). Under-use was associated with greater worry about one’s condition (OR=1.6 [1.1-2.4] and feeling that 911 transport is not safe (.5[.3-.8]). Billing and 911 policy concerns were unrelated to 911 use.

Conclusions: Results suggest a similar percentage of patients under- and over-utilize 911. Reasons for under-utilization include concerns over safety and patient condition, while reasons for over-utilization included gender and belief that 911 transport allows the patient to be seen more quickly. Concerns of billing and current 911 regulations did not impact use. These data will focus education of our citizens for appropriate 911 use in an emergency.

Study of False-Positive Emergency Medical Services Twelve-Lead Triages in Orange County California

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Background: Orange County started a field 12-lead program in 2005 to decrease time to emergency percutaneous coronary intervention (PCI) for field-identified acute myocardial infarction. Field triage is based on a 12-lead monitor internal computer interpretation. False-positive system activations for potential PCI have been identified as a problem for the program.

Objectives: To identify sources for false-positive triage to PCI centers.

Methods: Retrospective, case-control study of PCI triaged 12-lead cases from Feb 2006 to June 2007. Study variables were defined prior to the study. False-positive was defined as no intervention during cardiac catheterization or no attempted PCI for a positive 12-lead triaged case. Data were from the Orange County emergency medical services (EMS) database which included copies of 12-lead ECGs used for field triage. Odds ratios (OR) for positive PCIs were the statistical measure used.

Results: 548 patients were triaged from the field for PCI. 19 cases were excluded because of death prior to PCI, refusal of PCI, and co-morbid illness (sepsis, acute altered consciousness) that precluded PCI. 393 (74.3%) patients had PCI with significant coronary lesions. False-positives were associated with sinus tachycardia, OR = 0.38 (95% CI 0.23, 0.62); arterial fibrillation, OR = 0.43 (95% CI 0.20, 0.94); an ECG lead not recorded, OR = 0.39 (95% CI 0.20, 0.76); poor ECG baseline, OR = 0.59 (95% CI 0.25, 1.37); one of three brands of monitors used in the field, OR = 0.35 (95% CI 0.21, 0.59); and female gender, OR = 0.50 (95% CI 0.34, 0.75). Age was not associated with positive PCI as determined by ordinal regression (p=1.00).

Conclusions: For the urban-suburban EMS field 12-lead program studied, false-positive triage from the field was associated with poor ECG acquisition, underlying rhythms of arterial fibrillation and sinus tachycardia, and one brand of 12-lead monitor. Age was not associated with the performance of PCI or with positive coronary findings.
Is a Prolonged Stay in the Emergency Department Associated with Adverse Events in Older Patients?
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Objectives: To determine whether a prolonged stay in the emergency department (ED) is associated with an increased risk in the occurrence of adverse events (AEs) for older patients admitted to hospital.

Methods: This retrospective cohort study was conducted at a tertiary care facility in Atlantic Canada between July 1, 2005 and March 31, 2006. All community-dwelling persons 65 years admitted to an acute inpatient unit from the ED were eligible for inclusion. Using the 2007 Canadian Association of Emergency Physicians (CAEP) benchmark, the exposed group included patients with a total length of stay (LOS) in the ED of >6 hours for those triaged to emergent or urgent care and >4 hours for those triaged to less or non-urgent care. The unexposed group had an ED LOS less than the benchmark times. Outcomes were determined using the previously validated Wisconsin Medical Injury Prevention Program screening criteria. The criteria were applied to administrative data sources to identify AEs. Differences between groups were compared using the test for categorical data and an unpaired t-test or Mann Whitney U-test for continuous data. Using an analytic framework established a priori, multiple logistic regression analyses were performed.

Results: A total of 982 patients were eligible for inclusion. The average age was 77.8 years (SD 7.8). Based on the Canadian benchmark, the majority of the patients (75.0%) experienced a prolonged ED LOS. Of the 982 records, 140 (14.3%) had evidence of an AE. After adjustment, the total LOS (hours) in the ED was associated with an increased risk of an AE (OR 1.03, 95% CI 1.004-1.05). Those with an AE had twice the hospital LOS (20.2 vs. 9.8 days, P<0.00001). Conclusions: A prolonged stay in the ED is associated with an increased risk of an AE (OR 1.03, 95% CI 1.004-1.05). Those with an AE had twice the hospital LOS (20.2 vs. 9.8 days, P<0.00001). Those with an AE had twice the hospital LOS (20.2 vs. 9.8 days, P<0.00001).

158 Decreasing Lab Turnaround Time Improves ED Throughput and Decreases EMS Diversion
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The effect of decreasing lab turnaround times on emergency department (ED) efficiency can be estimated through system level simulation models and help identify important outcome measures to study prospectively.

Objectives: We used a sophisticated simulation model in place at a Level I adult urban ED with an annual census of 55,000. We determined the effect of decreasing turnaround times on emergency medical services (EMS) diversion, ED patient throughput, and total ED length of stay.

Methods: Data were generated by using Apogee Informatics Open ED Interactive Patient Flow Simulation on 30 separate days from 12/2/07 through 12/31/07. Open ED is a continuous simulation of ED flow, is driven by

Trends in U.S. Emergency Department Length-of-Stay by Patient and Hospital Factors, 2001-2005
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Introduction: Emergency department (ED) crowding has worsened over the past decade, and is reflected by changes in several factors, including ED length-of-stay (EDLOS). ED crowding is linked to ambulance diversion and patient dissatisfaction, and appears to degrade the capacity to provide optimal care.

Objectives: To determine recent trends in EDLOS. To determine the clinical, demographic and hospital factors that modify the association of between EDLOS and year.

Methods: We analyzed cross-sectional data from the National Hospital Ambulatory Medical Care Survey for the years 2001-2005. Regression models were used to quantify trends in EDLOS.

Results: From 2001-2005, the median EDLOS increased 4.0 minutes (95% confidence interval [CI] 1.0, 7.0) per year. Overall there was a 3.2% (CI 1.4, 5.0) annual increase in EDLOS for all patients. The median EDLOS for admitted patients increased from 226 minutes (interquartile range [IQR] 145, 353) in 2001 to 388 minutes (IQR 164, 385). Admitted patients without insurance experienced a 6.4% (95%CI 1.2, 11.6) annual increase in EDLOS. Uninsured patients admitted to intensive care or with an acute myocardial infarction had a 13.2% (CI 4.4, 22.0) yearly increase. EDs in the highest quintile by proportion of uninsured and Medicaid patients seen (i.e., safety net hospitals) had high but stable median EDLOS times over the study period; 141 minutes in 2001, (IQR 78, 240) and 138 minutes in 2005 (78, 239). By contrast, EDs in the lowest quintile by proportion of uninsured and Medicaid patients saw the greatest increases in median EDLOS from 116 minutes (IQR 64, 202) to 160 minutes (IQR 90, 275) and an overall increase in EDLOS of 6.7% (CI 3.7, 9.7 P<0.01) per year.

Conclusions: EDLOS in the U.S. is increasing. This increase is most pronounced among uninsured patients with a severe illness. Hospitals that serve populations with higher rates of private insurance or Medicare experienced the greatest increases in EDLOS between 2001 and 2005.

159 Decreasing Lab Turnaround Time Improves ED Throughput and Decreases EMS Diversion
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The effect of decreasing lab turnaround times on emergency department (ED) efficiency can be estimated through system level simulation models and help identify important outcome measures to study prospectively.
real-time actual patient data, and has intrinsic error checking to assume reasonable goodness-of-fit. We compared a return of complete laboratory results incrementally at 120, 100, 80, 60, 40, 20, and 10 minutes. Diversion calculation assumed EMS closure when >10 patients were in the waiting room and 100% ED bed occupancy had been reached for > 30 minutes. Length of stay was generated from data insertion into the patient flow stream and calculation of time to specific predefined gates. 

**Results:** Number of diversion days per month (maximum 17 at 120 minutes, minimum 10 at 10 minutes), total diversion hours per month (311 versus 194), and average ED length of stay (4.2 versus 3.4 hours) incrementally decreased, while average daily throughput (109 versus 117 patients) increased, as lab turnaround time decreased from 120 to 10 minutes.

**Conclusions:** Our simulation model suggests compelling improvement in ED efficiency with decreasing lab turnaround time. Outcomes such as average ED length of stay (4.2 versus 3.4 hours) incrementally decreased, while average daily throughput (109 versus 117 patients) increased, as lab turnaround time decreased from 120 to 10 minutes.

**Objective:** We sought to determine if emergency department (ED) crowding is associated with the likelihood of hospital admission decisions in patients with chest pain.

**Methods:** We performed a prospective cohort study of ED patients 30 with chest pain over a seven-year period in an urban, academic ED. Validated measures of ED crowding were measured at the time of ED triage including: waiting room number, ED occupancy, patient-hours and number of admitted patients. Logistic regression was used to determine the association between ED crowding and likelihood of being admitted to the hospital. We adjusted for age, race, gender, the thrombolysis in myocardial infarction (TIMI) risk score, time of day, and day of week.

**Results:** 6,088 patients were included. Mean age was 33 +/- 15, 69% were black; 57% female, median TIMI score was 1 (IQR 0-2) and 67% were admitted. Median number of waiting patients was 8 (IQR 4-12), ED occupancy 60% (IQR 45-72.5%), number of admitted patients was 6 (IQR 6-9) and patient-hours was 98 (IQR 68-142). The highest occupancy quartile was associated with a higher likelihood of admission compared to the lowest quartiles, OR 1.4 (95% CI 1.1, 1.8) and OR 1.2 (95% CI 1.0-1.4), respectively. Waiting room number was not associated with the likelihood of admission.

**Conclusions:** ED crowding measures are associated with a higher likelihood of physicians admitting patients with chest pain in a large cohort of ED patients. It is not clear why this association exists but it may indicate an effect of work environment on medical decision-making. If this effect is real, this practice may exacerbate ED and hospital crowding.

**162 A Randomized Comparison of Post-Simulation Debriefing versus Ongoing Feedback in Medical Simulation**

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**Medical College of Wisconsin**

**Objectives:** A key portion of a simulation session is self-reflection and instruction during a debriefing session, however, there is no consensus as to the most effective approach. The objective of this study was to compare two styles of managing a simulation session for third-year medical students: post-simulation debriefing versus ongoing feedback.

**Methods:** Study participants consisted of medical students enrolled in a medical resuscitation course at the Medical College of Wisconsin from September to December 2007. A component of the course is a code simulation. Students were randomly assigned to receive either debriefing following the simulation with minimal feedback occurring during the simulation (n=30) or feedback throughout the simulation without debriefing following the simulation (n=35). Assessment was made via survey using Likert-scale questions (1=strongly disagree, 7=strongly agree).

**Results:** The highly reliable data (α=0.78) indicated that there were significant differences in the students; perception of the debriefing/feedback helping them to understand the correct and incorrect actions (Mean [Standard Deviation] = 6.3 (0.6) vs. 5.5 (1.4), p=0.006), learn effectively (6.3 (0.6)) vs. (5.4 (1.6), p=0.004), and the overall effectiveness of the session (6.3 (0.8)) vs. (5.5 (1.7), p=0.027) with those receiving debriefing following the simulation rating these measures consistently higher. There were no statistically significant differences in the students; perception of the realism of the simulation, the debriefing style altering the realism of the simulation, their perception of the facilitator being disruptive during the simulation, or their enjoyment of the simulation.

**Conclusions:** Students feel that limited feedback during the simulation followed by a debriefing session helps them learn more effectively, better understand the correct and incorrect actions, and is overall more effective than ongoing feedback throughout a simulation.
Objectives: To evaluate medical students’ ability to manage unstable patients in a simulated setting, and to determine whether knowledge of the correct diagnosis or completion of an emergency medicine (EM) course increases the likelihood of appropriate management.

Methods: 101 senior medical students participated in a standardized patient case of ruptured abdominal aortic aneurysm wherein the patient simulates acute deterioration of his condition, with hypotension and tachycardia. Using predetermined definitions of correct responses, we analyzed post-encounter notes to determine whether students diagnosed the patient correctly and listed essential management steps. Discriminant validity was ascertained by presenting the case to a panel of 15 emergency department (ED) physicians, all of whom diagnosed and managed the case correctly per our definitions. We used chi-square analysis to compare: 1) the performance of students who had completed an EM clerkship with those who had not, and 2) the performance of students who diagnosed the case correctly with those who had not.

Results: Overall, 66% of students listed a correct diagnosis. 57% indicated need for IV access, 56% for fluids, and 33% for blood. 85% requested appropriate abdominal imaging (CT or ultrasound), though only 22% indicated that this needed to be done urgently. 71% requested surgical consultation. Students generating the correct diagnosis were more likely to consult surgery (59% vs 81%, p=0.007), though they were no more likely to order IV access, fluids, blood, or urgent imaging. Students who had completed an EM course were no more likely to list appropriate management steps than those who had not.

Conclusions: Senior medical students may not be prepared to effectively assess and manage unstable patients. Knowledge of the correct diagnosis does not predict appropriate management, nor does completion of an EM clerkship. This suggests lack of correlation between cognition and action, requiring specific additional education for students.

Objectives: We hypothesized that there would be no difference among faculty members in the percentage of residency candidate applicants they invited for an interview.

Methods: This study was a prospective, non-randomized, comparative trial. Four faculty members participated in a two-hour training session. All 234 residency candidate applications were reviewed independently by two faculty members. The decision on each applicant (Invite, Don’t Invite or Hold) was blinded and transcribed into a Microsoft Excel Database. Kappa interrater agreement scores and student’s t-test were used as appropriate. A p-value of 0.05 was considered significant and a Kappa score of >.500 indicated good agreement.

Results: Invitation to interview percentages among the four faculty members was 26.6% for faculty member D, 33.6% for faculty member A, 44.6% for faculty member B and 58.7% for faculty member C (p = 0.001 for data from faculty members D and C). Kappa scores indicating agreement among faculty based on Invite, Don’t Invite or Hold were as follows: faculty members A and C: kappa = 0.357 (95% CI: 0.203-0.511), faculty members A and D: kappa = 0.174 (95% CI: 0.049 -0.300), faculty members B and C: kappa = 0.402 (95% CI: 0.268-0.535), and faculty members B and D: kappa =0.239 (95% CI: 0.106-0.372).

Conclusions: There was poor agreement among faculty members as to which residency candidacy applicants to invite based on ERAS data, underscoring that multiple attributes may be involved in selecting applicants for residency interviews. EM residency programs may want to consider assigning more than one faculty member to review ERAS applications.

Objectives: The gold standard for teaching endovaginal ultrasound (EUS) to emergency physicians involves using a live model (LM) in a proctored setting. An ultrasound (US) mannequin (UM) has been developed to teach EUS. We hypothesize that novices can use a UM to learn EUS and transfer these skills to live patients.

Methods: A randomized, controlled, 3-phase study was performed using an LM and UM in teaching EUS to novices (<10 prior EUS). In phase 1, a baseline EUS was performed by each novice on an LM without instruction. Two blinded reviewers scored each baseline EUS using 17 explicit criteria for technical competence that were developed using the American College of Emergency Physicians (ACEP) Emergency US
Imaging Criteria Compendium. Each novice completed a 24-question computer-based EUS quiz testing EUS interpretation. In phase 2, novices were given a didactic presentation on EUS, followed by a hands-on lab. Using standardized instruction, one group performed EUS on a LM and a second group performed EUS on a UM. In phase 3, novices completed a post-test EUS, scored exactly as the baseline EUS, and repeated the computer-based quiz. Main outcomes were differences in baseline and post-test EUS scores and baseline and post-test quiz scores. Data were analyzed by group and between groups, using descriptive statistics and 95% CI.

Results: Of 19 novices, 9 were randomized to LM and 10 to UM. Results are reported as mean percent correct and 95% CI. LM baseline EUS 51% (32-70%), LM post-test EUS 88% (77-97%), UM baseline EUS 47% (38-55%), UM post-test EUS 85% (78-92%). LM baseline quiz 52% (34-70%), LM post-test quiz 85% (75-95%), UM baseline quiz 62% (53-71%), UM post-test quiz 81% (73-89%).

Conclusions: Novices significantly improved their EUS skills on a live model using a US mannequin for hands-on training. A US mannequin was shown to be equivalent to a live model in teaching the EUS technique and interpretation.

166 Utilization of the CARES Registry to Validate Termination of Resuscitation Protocol
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Objectives: This study utilizes the Cardiac Arrest Registry to Enhance Survival (CARES) dataset to externally validate the Advanced Life Support Termination of Resuscitation (ALS TOR) rule first proposed by Morisson. If a patient has 0/5 criteria (witnessed by bystander, witnessed by EMS, shock prior to transport, return of spontaneous circulation (ROSC) or bystander (CPR)) the resuscitation should be discontinued in the field. Secondary aims are to validate the rule in both BLS ALS systems in a nationwide cohort of 6 U.S. cities.

Methods: This is a secondary data analysis of prospectively collected data 10/01/05-9/07/07. The CARES registry includes: Atlanta, GA, Kansas City, MO, Anchorage, AK, Houston, TX, Austin, TX, Cincinnati, OH and Raleigh, NC. Primary outcome was Utstein survival.

Results: There were 4023 cases included in the CARES registry. 289 resuscitations were not attempted based upon local emergency medical services (EMS) protocols (i.e. rigor mortis). 2831 patients were worked arrests of presumed cardiac etiology as coded by the first responder/EMS personnel. Approximately 1% were lost to follow-up. Overall survival was 6.4%. 632 patients were determined to have zero out of five criteria based upon the TOR rule. Only 18 of these patients survived to admission to the hospital. The average LOS in the hospital was 86.3 hours. Of the 18 patients, no patient was discharged alive.

Conclusions: The sensitivity of the TOR rule on predicting which patients would survive and should therefore be transferred to the hospital was 100.0%. The negative predictive value (NPV), the ability of the rule to determine whether someone pronounced in the field would survive to discharge, was 100.0%. The sensitivity and NPV in the Ontario Prehospital Advanced Life Support (OPALS) study was also 100%. If the ALS-TOR rule had been utilized by the CARES registry, an additional 471 cases would have been terminated in the field without losing any survivors. This would have increased our field announcement rate from 14.8% (419) to 31.4% (890).

167 Out-of-Hospital Cardiac Arrest Survival after the Sequential Implementation of 2005 AHA Guidelines for Compressions, Ventilations, and Induced Hypothermia
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Objectives: To assess the impact on out-of-hospital cardiac arrest survival of the sequential implementation of 2005 American Heart Association (AHA) guidelines for compressions, ventilations and induced hypothermia.

Methods: Before and after clinical trial comparing survival to discharge for the following sequential periods: Baseline (16 months), new CPR (12 months), impedance threshold device (ITD) (6 months), and hypothermia (12 months). Included were all adults treated for cardiac arrest by emergency responders in an urban/suburban emergency medical services (EMS) system (population 815,000) with existing advanced life support (ALS). Excluded were patients <16 years and traumas. Electronic dispatch and ambulance records were reviewed. Survival rates with 95% CI were compared between intervention periods, and the adjusted odds ratio for each phase was determined by multivariate logistic regression. Neurologic outcomes are pending inter-rater reliability scoring and available by April 1, 2008.

Results: From January 2004 to October 2007 there were 2594 cardiac arrest patients: Baseline n=876, new CPR n=671, ITD n=291, hypothermia n=756. Demographics were similar between phases for all baseline characteristics, including mean age (65 years), male sex (58%), private residence (81%), witnessed status (36%), bystander CPR (36%) and VF/VT rhythm (26%). Overall and VF/VT survival increased significantly between phases: Baseline 2.4%, 12.1%, new CPR 4.0%, 21.8%, ITD 4.5%, 28.6%, hypothermia 6.7%, 37.4%. The odds ratio for overall survival from baseline to hypothermia was 3.0 (1.7-5.0) and for VF/VT survival 4.3 (2.2-8.6). The multivariate odds ratios for survival (95% CI): patient age 0.97 (0.96-0.99), bystander CPR 1.79 (1.18-2.72), new CPR 2.13 (1.12-4.04), ITD 2.33 (1.09-5.00), hypothermia 3.99 (2.19-7.27).

Conclusions: The sequential implementation of 2005 AHA guidelines for compressions, ventilations, and induced hypothermia lead to significant improvements in survival for cardiac arrest in this ALS EMS system. (Originally submitted as a “Late-Breaker”)
Objectives: Use of emergency medical services (EMS) by older adults has been associated with poor physical health, functional decline, mental health conditions, demographic, and social factors. The aims of this study are to evaluate the rate of EMS use and assess correlates of use in a sample of older adults receiving aging social services.

Methods: A stratified random cross-sectional sample of aging services clients receiving an initial in-home visit were interviewed. Use of EMS during the preceding 90 days, sociodemographic variables, physical health, functional status, mental health, social support, and life events were assessed. Chi square, Test for Trend and Wilcoxon rank tests were used to assess categorical, ordinal and continuous level variables, respectively, in bivariate analyses, and multivariate logistic regression to assess for independent correlates of EMS use.

Results: Fifty-one of the 379 subjects (13.5%) used EMS in the prior 90 days. Forty of the 51 subjects using EMS (78%) reported an emergency department visit and 25 (49%) reported a hospital admission. In bivariate analyses, the number of medical conditions (p<.001), number of clinical conditions (p=0.0147), ADLs (p<.0001), IADLs (p<.0001), PHQ-9 depression score (p=.0359), Goldberg anxiety score (p=.0692), and perceived social support from friends (p=.0505) were associated with use. Statistically significant correlates of EMS use that remained in the 6 variable multivariate model included ADLs (p=.0103), # of medical conditions (p=.0086), social support from friends (p=.0271) and Goldberg anxiety score (p=.0485).

Conclusions: The rate of EMS use was much higher than reported in the general older adult population. Independent correlates of use included poor physical health, decline in functional status, low perceived social support from friends, and symptoms of anxiety. Larger studies are needed to more closely examine this high utilization group of older adults to examine how the aging services network and EMS systems can adequately address the needs of our growing aging population.

Objectives: The intranasal (IN) route may be useful for naloxone administration as it reduces the risk of needle-stick injury in patients at higher risk of blood-borne viruses. Previous research suggests moderate effectiveness compared to the parenteral route, however, the dilute solution used for the parenteral route is not ideal for IN use. A more concentrated solution might be more effective. Our aim was to compare the effectiveness of concentrated IN naloxone (2mg/mL) compared to intramuscular (IM) naloxone for treatment of suspected opiate overdose. We hypothesized that the IM method would be more effective with respect to the defined endpoints.

Methods: This prospective, randomized controlled trial included patients treated for suspected opiate overdose in the prehospital setting. Patients were randomized to either IM naloxone or concentrated IN naloxone (2mg) via a mucosal atomisation device in addition to basic life support. The primary study outcome was the proportion of patients who responded (GCS >13 and/or spontaneous respirations >10/minute) within 10 minutes of naloxone treatment. Analysis is by descriptive statistics and univariate analysis (Fisher’s exact test). Sample size was calculated at 80 per group. Study results: 135 patients have been analyzed: median age 30 yrs, 75% male. 65 (48%) received IN naloxone. Response rates were similar: IN naloxone (44/65, 68%) compared with IM naloxone (56/70, 80%) (OR 1.91, 95% CI 0.87 to 4.18, p=0.15). There were no major adverse events.

Conclusions: Concentrated IN naloxone successfully reversed heroin overdose for a high proportion of patients and appears to have a similar success rate to IM administration. These results support IN naloxone use as first line treatment for heroin overdose. (Originally submitted as a “Late-Breaker”)
Results: 18,982 patients met criteria and complete data were available for 15,888 patients (83.7%) (study group). 2,324 (14.6%) achieved ROSC. 693 patients (4.4%) survived and 29.8% of ROSC patients survived (693/2324). Median TI for the entire study group was 4.3 min (interquartile range-lower quartile 3.0, upper quartile 6.0). Median TI was 4.0 min (2.8, 6.0) for survivors and 4.3 (3.0, 6.0) for non-survivors. Logistic regression revealed multiple factors that were independently associated with survival: witnessed arrest (OR 2.9; 95% CI 2.3, 3.7), initial rhythm of VF (2.3; 2.0, 2.6), bystander CPR (2.2; 1.8, 2.7), and shorter response interval (1.3; 1.2, 1.3). There was no association between TI and survival in the study group (1.0; 0.97, 1.1) or the ROSC subgroup (1.0; 1.0, 1.1).

Conclusions: In a large OHCA study from demographically diverse EMS systems, longer transport interval was not associated with increased mortality. This supports conducting rigorous trials assessing the impact of bypassing local hospitals to take patients to specialized centers for post-resuscitation care.

171 Pediatric Drug-Dosing Errors in Emergency Medical Services
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Background: Children are particularly vulnerable to drug-dosing error (DDE). However, little is known about DDE in the emergency medical services (EMS) setting where pharmacist checks, automated drug dispensing and computerized order entry do not exist.

Objectives: To identify the incidence of drug-dosing errors in pediatric EMS patients.

Design/Methods: This was a retrospective review of pts (<18 years) entered in an electronic EMS database from January 2004 through June 2006. Nine EMS agencies were represented which serve a demographically diverse population and approximately 10% of the state population. Standards for correct doses were based on the state’s model EMS pediatric protocols. Error was defined as >10% difference in dose from the protocol standard based on the patient’s documented weight. Descriptive statistics are reported with confidence intervals.

Results: 743 of 10,566 pts (7.0%) received drugs, 627 (84.4%) had a documented weight for analysis. Mean age was 9.7 years (+/- 0.1 yr), 63.5% were male. Drugs were administered 1056 times to 627 pts. Incorrect dosing occurred in 349 of 1056 (33% 95% CI 30.36%). 71.5% of paramedics in the database did not administer a drug to a pediatric pt during the 2.5 year study period. Broselow tape use was documented in 41 of 336 patients (12.2% 95%CI 9.1,16.1%) &#163; 12 years. The 5 most frequently used drugs with incorrect administration (95% CI) were: albuterol 17.8% (14.3, 21.9), atropine 32.1% (22.7, 43.0) midazolam 74.6% (62.1, 83.9), epinephrine 77.8% (69.7, 84.1) and morphine 96.9% (94.0, 98.4). Other than morphine, the highest error rates were in the least utilized drugs: dextrose 97.6% (87.7, 99.4) and diazepam 81.7% (78.3-96.2).

Conclusions: Drug dosing errors by paramedics to pediatric patients are frequent with only albuterol and atropine doses correct more than 50% of the time. Strategies are needed to help paramedics provide correct drug doses to pediatric patients.

172 Levels of Serum GFAP Are Associated with Severity of Injury in Patients with Mild and Moderate Traumatic Brain Injury
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Objectives: Glial fibrillary acidic protein (GFAP) is found in glial cells. This study examined whether GFAP measured in serum was significantly elevated in mild and moderate traumatic brain injury (MMTBI) patients compared to uninjured controls and if there was an association with severity of injury.

Methods: This prospective case control study enrolled consecutive adult patients presenting to a tertiary care Level 1 trauma center following an MMTBI defined by blunt head trauma followed by loss of consciousness, amnesia, or disorientation and a GCS 9-15. Controls were patients without TBI presenting to the ED for orthopedic injuries. Blood samples were obtained from each patient on arrival to the ED within 2 hours of injury and measured by ELISA for levels of GFAP (ng/ml). The primary outcome was severity of injury as measured by dichotomized GCS score on arrival to ED (GCS 13-15 vs GCS 9-12) compared to control. Secondary outcome included the presence of intracranial lesions on head CT. Data are expressed as mean (±SEM) and were analyzed using Mann Whitney U and Kruskall Wallis.

Results: Over 3 months 53 patients were enrolled: 35 with GCS 13-15, 4 with GCS 9-12 and 14 controls. The mean age was 37 years (range 18-69) and 66% were male. Intracranial injuries were found on CT in 17.1% of GCS 13-15 and in 100% of GCS 9-12. The mean GFAP serum level was 0 in control patients, 0.107 (±0.012) in patients with GCS 13-15 and 0.366 (±0.126) in GCS 9-12 (P<0.001). The difference between GCS13-15 and controls was significant at P<0.001. In patients with intracranial lesions on CT, GFAP levels were 0.234 (±0.055) compared to 0.085 (±0.003) in patients without lesions (P<0.001).

Conclusions: There is a significant increase in serum GFAP in patients with both MMTBI compared to uninjured controls. GFAP was also significantly elevated in patients with intracranial lesions on CT compared to those without lesions. These data suggest that GFAP is a potential serum biomarker for MMTBI.
173  **S-100B Immunoassay: Serology for Assessment of Minor Head Injury in the Emergency Department**
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**Background:** Over 8 million patients present annually to emergency departments in North America with minor head trauma (MHT). Many undergo unnecessary head computed tomography (HCT). S100b, a CNS peptide, may be a marker of injury.

**Objectives:** To determine if S100b levels could be used to screen for significant head injury.

**Methods:** Prospective observational trial of consecutive adults with MHT. Patients presenting within 6 hours of injury and undergoing HCT for evaluation were eligible. All CTs were blindly reviewed for presence of a priori defined intracranial injury (HCT+). Quantitative S100b levels were determined for all HCT+ and a random sample of HCT- patients by ELISA.

**Results:** 346 patients were enrolled over 12 months, mean age 47 (+/- 23), 62% male. Twenty-two (7%) were HCT+. Vomiting (p=0.001), headache (p=0.001), antegrade amnesia (p=0.002), visible trauma above clavicles (p=0.045) and signs of basal skull fracture (p=0.005) were all associated with HCT+. A GCS of 15 was associated with a negative HCT (p=0.029). S100b levels were significantly elevated in patients with nausea/vomiting (p=0.009). S100b levels were elevated in HCT+ patients but did not meet significance (p=0.312). Using an established S100b cutoff of 42 g/dl, the sensitivity and specificity for detection of HCT+ patients was 87% (95% CI, 64-96) and 35% (95% CI, 29-46), respectively. The negative predictive value was 94% and ROC analysis showed an AUC of 0.64 (95% CI, 0.52-0.77). Three patients had false negative levels; none required surgical intervention.

**Conclusions:** Sensitivity of S100b alone in screening for significant head injury is similar to sensitivity of Canadian rules and specificity is higher than that of New Orleans criteria. S100b may have improved predictive value when applied to populations with lower pre-test probability. Further study is necessary to identify these groups and a larger sample size is needed to assess assay performance and carry out logistic regression.

174  **Levels of UCH-L1 in Human CSF and Outcome following Severe Traumatic Brain Injury**
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**Objectives:** Preliminary data in humans have shown that levels of Ubiquitin C-terminal hydrolase (UCH-L1) in CSF correlates with severity of traumatic brain injury (TBI). This study assessed the ability of UCH-L1 to predict 6-week functional outcome by examining the relationship between initial levels of UCH-L1 in human CSF following a severe TBI and the Glasgow Outcome Scale (GOS) score at 6 weeks.

**Methods:** This prospective cohort study enrolled consecutive adult patients presenting to 3 tertiary care teaching hospitals following a severe TBI defined by GCS<8 and requiring invasive intracerebral monitoring. Ventricular CSF was drained from each patient at 6,12,24,48,72 and 96 hours following TBI and measured by ELISA for levels of UCH-L1 (ng/ml). The primary outcome was level of functioning at 6 weeks after injury as measured by the dichotomized GOS score (Good outcome=good recovery and moderate disability; Poor outcome=severe disability, persistent vegetative state and death). Data are expressed as mean ±SEM and were analyzed using Mann Whitney U and independent sample t-tests.

**Results:** Over 16 months 41 patients with severe TBI were enrolled: mean age of 38 years (range 18-67), 80% male, and mean GCS=5 on ED arrival. At 6-weeks post-injury, 7 patients (17.1%) had a good outcome (GO) and 34 (82.9%) had a poor outcome (PO). Mean UCH-L1 levels at 12-hours post-injury were 14.4 (±7.2) in those with GO vs 71.2 (±22.5) in those with PO (P=0.025); levels at 24-hours were 7.6 (±3.8) in the GO vs 55.7 (±15.0) in the PO group (P=0.005); levels at 48-hours were 16.5 (±4.7) in the GO vs 46.8 (±10.0) in the PO group (P=0.010).

**Conclusions:** There were significantly higher UCHL1 levels in CSF within 48-hours of injury following severe TBI in those patients with a poor outcome compared to those with a good outcome at 6 weeks. If these findings can be duplicated using a larger sample size, this novel biomarker may be used as a predictor of early outcome in TBI.

175  **Neurocognitive Impairment in Emergency Department Concussion Patients**
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**Objectives:** Concussions may cause subtle but important neurocognitive impairments. While ample data describe these deficits in sports medicine outpatients, only limited efforts characterize concussion sequelae in emergency department (ED) patients. We identified neurocognitive impairments in patients presenting to the ED with a concussion.

**Methods:** We prospectively studied patients ages 18-59 at an urban academic ED. Cases included patients with a concussion, GCS 13-15 and a normal head CT scan. Controls included patients with an isolated non-dominant extremity injury (sprain, laceration, etc.) but no head injury. We excluded patients with multiple or major injuries or recent alcohol consumption. Using a standard computer neurocognitive test battery (Immediate Post-concussion Assessment and Cognitive Testing), we evaluated concussion symptom, visual memory...
and verbal memory scores, and visual motor and reaction times. We compared neurocognitive performance between cases and controls using Bonferroni-corrected t-tests.

**Results:** We studied 23 concussion cases and 31 controls. Group age (31.2 ± 9.6 years, p=0.60) and education (14.9 ± 2.8 years, p=0.64) were similar. Concussion symptom scores were higher for cases vs controls (19.8 ± 10.3, p=0.03). Compared with controls, cases demonstrated slower raw (31.6 vs. 37.9 sec, p=0.002) and age-normalized visual motor speed (26.0 vs. 54.0 percentile, p<0.001), and slower raw (0.68 vs. 0.60 sec, p=0.007) and age-normalized reaction times (25.5 vs. 45.6 percentile, p=0.006). Cases and controls exhibited similar raw (63.8 vs. 67.3, p=0.37) and age-normalized verbal memory (33.5 vs. 47.7 percentile, p=0.11), and similar raw (79 vs. 83, p=0.26) and age-normalized visual memory (29.9 vs. 35.7 percentile, p=0.46).

**Conclusions:** Compared with the non-head-injured, ED concussion patients demonstrate subtle but discernible neurocognitive impairments. ED neurocognitive evaluation of concussions is feasible and may augment clinical care.

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**176 Acoustic Cardiographic Analysis for the Immediate Diagnosis of Heart Failure in Patients Presenting to the ED with Acute Dyspnea**

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**Objectives:** Acute decompensated heart failure (ADHF) has a high misdiagnosis rate. As delayed or erroneous ADHF therapy is associated with increased mortality, an early accurate diagnosis is critical for optimal outcomes. Our purpose was to determine if analytic processing of the ECG, with digitally recorded heart sound data (Inovise, Portland, OR), improves early ED diagnostic accuracy.

**Methods:** Using the heart failure and Audicor technology for rapid diagnosis and initial treatment (HEARD-IT) multinational database of patients presenting to the ED with acute dyspnea, we evaluated S3 strength (S3S), electromechanical activation time (EMAT), and the systolic dysfunction index (SDI) which is the product of S3S, EMAT/RR interval, QRS duration, and QR interval, for diagnostic accuracy within 15 minutes of ED presentation. A gold standard diagnosis was determined by 2 cardiologists blinded to acoustic data, reviewing all records at the end of the hospitalization. Statistics: For ADHF prediction, SDI, EMAT, and S3S optimal cut points were determined by ROC curve analysis.

**Results:** There were 1006 patients with data available for analysis; of these 554 were male, 441 white, and 486 black. ADHF was ultimately diagnosed in 413 (41.1%). Overall, emergency physicians correctly diagnosed ADHF in only 31.8% within the initial 15 minutes of hospitalization. SDI was most accurate for identifying ADHF. The ROC derived cut point of an SDI 4.5 correctly identified 65.4% of ADHF patients within 15 minutes of ED presentation (OR=7.9, p<0.001). Only 19.3% of patients with SDI 4.5 were ultimately diagnosed as not having ADHF. Forcing a 90% specificity gave the following cut points predictive of ADHF: SDI 5.4 (OR=9.1, p<0.001), S3S 79 (OR=7.3, p<0.001), and EMAT 114 (OR=4.2, p<0.001).

**Conclusions:** The systolic dysfunction index provides greater accuracy than the physician, or any other acoustic cardiographic parameter, in the early diagnosis of ADHF.

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**177 Pre-hospital Use of Continuous Positive Airway Pressure for Acute Congestive Heart Failure**

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**Introduction:** Significant data exist which suggest continuous positive airway pressure (CPAP) improves hemodynamic parameters and decreases rate of endotracheal intubation in patients presenting with acute congestive heart failure (ACHF). However, little is known regarding the use of CPAP for ACHF in the pre-hospital setting.

**Objectives:** The purpose of this study is to assess the ability of pre-hospital CPAP to improve outcomes in a subset of patients suffering from ACHF.

**Methods:** Between November, 2003 and April, 2006, we reviewed all cases of acute decompensated CHF transported by EMS to three metropolitan emergency departments. Abstracted from EMS and hospital records were demographic data, initial oxygen saturation, vital signs, and interventions, including medications, CPAP, endotracheal intubation, and mortality. Cases involving the use of CPAP by EMS were matched to control cases without EMS CPAP use. Differences between groups were tested using paired t-test, chi-squared, or Fisher’s test.

**Results:** Of 126 cases of ACHF reviewed, 29 cases receiving CPAP by EMS were matched to 29 controls not given CPAP by EMS. Matching criteria were initial oxygen saturation, initial vital signs, age, and gender. The CPAP group had much greater improvement in oxygen saturation upon ED arrival (8.64% increase vs. 2.96%; P<.001) but other outcomes such as intubation (10.3% vs. 17.2%; P=.706) and mortality (6.9% vs. 13.8% P=.670) were the same. Patients treated with EMS CPAP received less Furosemide in the ED (34.5% vs. 75.9%; P=.002) although other resource utilizations were the essentially the same.

**Conclusions:** Although this study provides evidence that CPAP initiated in the field by paramedics improves the oxygen parameters of acute CHF patients arriving in the ED, outcomes such as mortality and intubations are not impacted significantly.
Practical use of stethoscope-captured and computer analyzed heart tones may help detect abnormal cardiac sounds but has proven challenging in the ED.

**Objectives:** To estimate the suitability of recorded heart tones to identify abnormal cardiac sounds by two distinct methods: 1) a digital noise score (% of noise relative to the maximum signal amplitude) and 2) detection of discrete sound peaks in a single cardiac cycle.

**Methods:** A Think Labs Electronic Stethoscope was used for 335 digital recordings in 261 patients at 15-90 degrees in the 4th or 5th left intercostal space. Patients were over 50 years old with signs and symptoms of possible heart failure. Noise scores were defined a priori as: <6 good, 6-12 fair, 12-20 poor, and >20 unacceptable. Number of peaks was defined as 0 = failure to detect, 1-3 = normal, >4 = abnormal sounds detected. The two methods were compared by chi-square with p<0.05 considered significant.

**Results:** Mean noise score + SD was 12.8 + 3.7 (min = 0.7, max = 96.7). Unacceptable and poor noise scores were present in 48 (14%) and 103 (31%) of patients, respectively. Peak detection failed in 75 (22%) cases, was normal in 145 (43%), and abnormal in 115 (34%). There was no significant difference in noise scores across the three groups. Subjective operator experience suggested that while ED ambient noise could be largely eliminated, physiological sounds (e.g., breathing, patient movement) and technical issues (stethoscope position, investigator movement) were responsible for noise.

**Conclusions:** Analysis for abnormal heart tones utilizing stethoscope recorded digital sounds can be achieved in ED patients but has a high degree of noise and an unacceptable failure rate by peak analysis. Comparison between the two methods for suitability to identify abnormal cardiac sounds indicates no correlation. Optimal technique for stethoscope capture of heart tones consistently acceptable for ED digital analysis requires further refinement before widespread clinical adoption.

**Background:** Endurance exercise has been associated with cardiac biomarker elevations suggesting myocardial damage in recreational athletes. The effect of pre-race training on cardiovascular injury is unclear.

**Objectives:** To evaluate the relationship between training levels and myocardial injury in recreational marathon runners.

**Methods:** 53 healthy participants of the 2006 Silicon Valley Marathon voluntarily enrolled in this prospective study conducted at an academic medical center. Exclusion criteria included history of heart disease, diabetes, hypertension, or hyperlipidemia or inability to finish the race. Each participant completed a questionnaire that provided subjective training measures including hours run per week (Hr/W) and a composite work index (CWI). Pre-race echocardiography (ECHO) and heart rate variability (HRV) measurements previously shown to correlate with cardiac fitness served as objective training measures. Cardiac biomarker levels (iSTAT® cardiac troponin I (cTnI) and brain natriuretic peptide (BNP) were obtained one-day pre race, immediately post race, and one-day post race. cTnI levels >0.1 ng/ml and BNP levels >50 pg/ml were considered elevated. We used logistic regression analysis to evaluate any association between Hr/W, CWI, ECHO, and HRV measures and cardiac biomarker levels.

**Results:** Forty-eight runners completed the study protocol. Pre-race serum cTnI levels were normal in all runners, while two participants had increased BNP levels. Immediately post race, 11 (23%) and 7 (15%) participants had elevated cTnI and BNP, respectively. One-day post race, three of the 11 had persistently increased cTnI, while one participant had a newly increased cTnI. Twelve runners had elevated BNP. The measured pre-race training parameters did not correlate with cTnI or BNP increases.

**Conclusions:** Although healthy marathon runners had increased cardiac markers post race, no association existed between objective or subjective measures of training and cTnI or BNP elevations.

**Objectives:** In the context of an ED protocol of acute rhythm control for acute atrial fibrillation (AAF), some clinicians believe that pretreatment with IV rate control (RC) drugs enhances safety and the chance of successful cardioversion. We sought to test this belief.

**Methods:** We conducted a health records review of consecutive patient visits over a 5-year period for adults who presented to a university hospital ED with acute-onset AAF (<48 hours) and were managed with rhythm control. All patients received IV procainamide followed by electrical cardioversion if necessary. At the discretion of the attending ED physician, some patients were pretreated with IV RC drugs, usually 1 or 2 doses of IV metoprolol (5mg) or diltiazem (15-25mg) given over 5-10 minutes. Outcomes included conversion, adverse
Utility of Electrocardiography for Stratification of Patients At-risk for Left Ventricular Hypertrophy

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Background: Electrocardiograms (ECGs) are commonly used for evaluation of left ventricular hypertrophy (LVH). Though prior investigation has suggested variable accuracy, the utility of specific ECG criteria for risk stratification of ED pts at high-risk for LVH has not been defined.

Objectives: To compare the accuracy of 3 ECG criteria for the diagnosis of LVH in undifferentiated, ED patients with HTN.

Methods: A convenience sample of ED patients with HTN were enrolled over 18 months. Those with dyspnea or chest pain, a known history of HF, coronary artery disease, cardiomyopathy, renal failure or valvular heart disease were excluded. ECGs were obtained with evaluation for LVH using the following criteria: Cornell voltage (R wave aVL + S wave V3 + 8 [if female]) 28 mm; Cornell product (Cornell voltage x QRS duration 2440 mm x ms); and Minnesota Code 3.1/3.2 (V5 > 26 mm, V6 > 26 mm, I > 20 mm, II > 20 mm, III > 20 mm, aVF > 20 mm, or aVL > 12 mm). Echocardiography was then performed with interpretation by a single board certified cardiologist. LVH was defined by the presence of one or more of the following validated criteria: interventricular or posterior wall thickness 1.3 cm, LV mass 225 g (male) or 163 g (female) or LV mass indexed to height 2.7 48 g/m 2.7 (male) or 45 g/m2.7 (female). Sensitivity and specificity with corresponding 95% CIs are reported for a cohort of 67 patients.

Results: LVH was present in 59 subjects (88.1%; 95% CI 80.3, 95.8), 95.5% of whom were black (mean [SD] age 49.6 [9.4] yrs; 53.7% male). The sensitivity and specificity (95% CI) for the Cornell voltage, Cornell product and Minnesota code were 25.4% (14.7, 36.2) and 50.0% (1.0, 99.0), 25.4 (14.7, 36.2) and 50.0% (1.0, 99.0) and 27.0% (16.0, 37.0) and 75.0% (32.6, 117.4), respectively.

Conclusions: In this cohort of high-risk patients, ECG criteria correlated poorly with LVH as identified by echocardiography. The utility of ECG for LVH risk stratification in the ED is limited at best.

182 Kansas City Cardiomyopathy Questionnaire: Value in Heart Failure Patients Presenting to the Emergency Department
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Objectives: Estimating anticipated hospital admission and subsequent length of stay (LOS) in emergency department (ED) patients with heart failure (HF) allows proper selection of patients for observation unit care. The Kansas City Cardiomyopathy Questionnaire (KCCQ) is validated to measure changes in HF severity over a 2 week period, correlates with HF class and morbidity, but has not been tested as a prognostic tool in the ED. We examined the relationship between the KCCQ score and hospital admission rate and LOS to identify a cohort suitable of observation unit care.

Methods: At 2 academic centers, a prospective convenience sample of pts being treated for HF completed a KCCQ questionnaire during their ED visit. Treating physicians were blinded to the results and management was not influenced. Pts were followed through the hospital course. Measures of association with the KCCQ score (0100) were calculated for the primary outcome (composite of ED discharge and hospital LOS <48 hours). The KCCQ score was analyzed as both a continuous variable and then dichotomized (score>25) based on prior studies. Logistic modeling was performed to account for covariates associated with increased morbidity, including blood pressure and renal function.

Results: The cohort comprised 90 pts, 56 men (62%) and 34 women (38%) with a median age 61 yrs (IQR 52,76). The majority (93%) were admitted to the hospital for a median of 4 days (IQR 2.7). The primary outcome measure was met by 33 (37%). As a continuous variable, the KCCQ score was not associated with LOS but an association did exist when examined as a dichotomized variable (OR 2.9, 95% CI 1.5,5.6). This relationship remained strong but was no longer significant after adjusting for covariates of morbidity (OR 2.7, 95% CI .98, 7.5).

Conclusions: The results suggest that KCCQ score may be a useful tool to predict hospital admission and LOS among ED patients with HF. A larger prospective study is required to further assess this hypothesis.
The Prevalence and Factors Associated with QTc Prolongation among Emergency Department Patients

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**Objectives:** Previous studies have suggested that QTc prolongation may lead to significant morbidity and mortality. The prevalence of QTc prolongation among emergency department (ED) patients has not been described. The primary purpose of this study was to find the prevalence of QTc prolongation among ED patients and describe their presentations.

**Methods:** This was a retrospective review of de-identified records at a university tertiary ED. All patients who had an ED EKG done for any reason over a three-month period were potentially eligible for the study. Patients whose initial EKG was not available or whose EKG rhythm was documented in the ED chart as non-supraventricular in origin were excluded from the study. As per convention, QTc prolongation was defined as computer-generated QTc intervals 450 msec for men and 460 msec for women. EKG data, demographic information, medical histories, home medications, laboratory results, ED diagnoses, ED dispositions, and in-patient outcome data were collected.

**Results:** Of the 1570 cases, 544 had QTc prolongation (35%, 95% confidence interval 32-37%). The prevalence of QTc intervals 500 msec was 8% (120/1570, 95% CI 6-9%). The most common comorbidities were structural heart disease, renal failure, and stroke. Forty-four percent (239/544, 95% CI 40-48%) of patients with any degree of QTc prolongation were discharged from the ED. Twenty-three percent (28/120, 95% CI 16-32%) of patients with a QTc 500 msec were similarly discharged. None of the patients with any degree of QTc prolongation who died in the ED or during hospitalization (27/544, 5%, 95% CI 3-7%) had QTc prolongation or tarse de points listed as a cause of death.

**Conclusions:** QTc prolongation occurred frequently among ED patients who had an EKG done for any reason. Patients with major prolongations were more likely to be admitted. However, these data suggest that ED-diagnosed QTc prolongation may be benign in the short-term.

Characteristics of Central Venous Cannulation Complications in the Emergency Department

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**Introduction:** Clinical guidelines recommend that physicians insert the majority of central lines into the internal jugular (IJ) or subclavian (SC) veins. The purpose of our study was to identify characteristics of IJ and SC central line insertion complications in the emergency department (ED).

Methods: This was a prospective observational trial of central venous cannulation attempts of either the SC or IJ in a university tertiary care center over a 9 month period. The outcome of interest was a composite of adverse events defined as hematoma, arterial cannulation, pneumothorax, and unsuccessful placement. Physicians who performed the procedure recorded anatomical site, method of insertion, and acute complications. Physicians had at least 9 months of training experience. ED charts and pharmacy records provided variables of interest.

**Results:** Physicians placed 270 consecutive central lines in 244 patients, inserting 179 and 91 into the IJ and SC veins, respectively. Physicians encountered an adverse outcome in 22% of cases, the most common being unsuccessful placement (12%) followed by hematoma (5%) and arterial puncture (3%). Only 1 pneumothorax occurred. Physicians utilizing ultrasound (OR=.47, 95% CI .25, .88) and patients on vasopressors (OR=.50, 95% CI .25, .99) were less likely to experience an adverse outcome while BMI category, INR greater than 2, and physician experience were not significant. The mortality rate was 21%. There was no difference in hospital mortality between cases with an adverse outcome and cases without.

**Conclusions:** Central lines inserted under ultrasound are less likely to have an adverse outcome. Hypotension may cue physician procedural techniques that result in fewer adverse outcomes. BMI may be a poor predictor of adverse outcomes.

Automated Software for Semi-quantitative Analysis of Immunofluorescence Intensity in Skin Endothelium

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The pathophysiology of septic shock involves altered expression of endothelial cell (EC) signaling and adhesion molecules. Immunofluorescence microscopy (IFM) is an invaluable technique for studying the localization and concentration of specific proteins. In the past, IFM data have generally been presented as representative images, raising questions of sampling and selection bias by unblinded researchers. We have designed software using MatLab to analyze IFM images which can solve many of these problems, and we developed a robust manual scoring system to validate the software.

**Objectives:** To compare automated analysis (AA) and manual analysis (MA) of IFM images for determining relative expression of EC adhesion molecule, P-Selectin (PS), in skin endothelium.

**Methods:** Skin sections from 2 septic (cecal-ligation and puncture, CLP) and 2 non-septic (SHAM surgery) mice were stained for PS and CD31 (an EC specific marker). IFM works by staining the EC with anti-CD31 (fluoresces red) and anti-PS (green), then examining the slide for co-localization (yellow). For MA, images were randomized and vessels rated for intensity of PS staining on a 5 point standardized color scale by 3 blinded
scorers. For AA, ECs were identified by thresholding (Otsu’s Method) and morphological operations on the CD31 fluorescence signal, and then applied as an image mask to quantify PS color intensity. Correlation was measured by Spearman (r).

Results: Average intensity of PS staining by MA for CLP vs SHAM was 2.35 vs 1.81 (p<0.007), and 2.46 vs 1.21 (p<0.002) by AA. Inter-operator reliability for MA (mean r for scorer pairs) was 0.89, and for AA (run 3 times) was 1.0. AA was well correlated with MA, r = 0.78 (p<0.0001) supporting the use of automated analysis.

Conclusions: Our software had good correlation with manual analysis of IFM intensity. The software has perfect reproducibility and allows for analysis of larger sample sizes to yield an unbiased assessment of fluorescence staining when performing IFM.

186  Prevalence and Accuracy of Right Ventricular Strain in Emergency Physician Echocardiography
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Background: Presence of right ventricular (RV) strain may be of diagnostic value in patients with dyspnea or hypotension and may be of prognostic and/or therapeutic importance in patients with diagnosed pulmonary embolism. However, formal echocardiography is inconsistently available in EDs, and it is unknown if EPs with goal-directed training can reliably detect RV strain on bedside EP echo.

Objectives: We sought to determine the prevalence of RV strain and the accuracy and agreement of this finding compared to expert review and cardiology echo in patients undergoing EP echo.

Methods: Prospective observational study of consecutive ED patients undergoing bedside EP echo. FAST exams were excluded. Echoes were performed using a Philips EnVisor or HD11XE with phased array probe and tissue harmonic imaging. RV strain was considered significant if RV: LV ratio was qualitatively >1:1. All echoes were recorded on DVD and reviewed by an RDGS certified EP with fellowship training in EUS blinded to EP echo interpretation and patient presentation. Patient records were followed to determine if formal cardiology echo was performed within 72 hours with results recorded by a second blinded observer.

Results: There were 845 EP echoes performed by 69 different EPs over a 12 month period (mean 12 echoes per EP). Average patient age was 58.9 ±19.7 yr, 48% were male. Significant RV strain was noted to be present in 3.8% (n=32) of all ED echoes. Formal cardiology echo followed in 49% of EP echoes (n=411). Agreement with expert EP review was 98.5 ± 5.8%; kappa of 0.786 (95% CI 0.672-0.899). In the subset of patients who underwent formal echo, agreement with RV strain was 94.4 ± 9.1%, kappa 0.483 (95% CI 0.304-.663).

Conclusions: In this observational study, presence of RV strain showed good agreement with expert review and moderate agreement with formal cardiology echo. Further study is needed to determine learning curve of this echo finding.

187  A Comprehensive Approach to STEMI Recognition and Reperfusion Significantly Reduces Door-to Balloon Time
David Burt, Amita Sudhir, Steven Tropello, Robert O’Connor
University of Virginia

Objectives: A comprehensive clinical evaluation and decision process designed to minimize time to reperfusion in acute STEMI was implemented at a university teaching hospital. The objective was to measure the effect of this program on mean reperfusion time (the interval from ED arrival to balloon inflation) of ED patients presenting with acute STEMI. The effect on variability (as in indirect measure of process standardization) was also assessed.

Methods: This program was developed to help hospitals optimize each facet of the STEMI treatment interval, from initial recognition to reperfusion. It combines individual components such as a standardized screening ECG protocol and basic data collection forms, with a web-based education module and a STEMI ALERT Packet (customized to each site). A before and after study of 151 patients presenting to the ED at this tertiary care university hospital (either as walk-ins or transported by EMS) between Jan 1, 2005 and Nov 18, 2007, was conducted. All included patients were ultimately diagnosed with STEMI and received PCI as the primary intervention. Time to reperfusion was measured for each patient. Data were analyzed using a Welch’s t-test.

Results: Process implementation occurred on September 11, 2006. 96 STEMI cases were evaluated prior to this date and 55 cases after. There was a significant reduction in mean reperfusion time from 82.3 mins to 56.5 mins. This was a reduction of 26 mins (95% CI 17 to 33, P<0.0001) per event. There was also a significant decrease invariability from a variance of 964 (pre-implementa- tion) to 325 (post-implementation).

Conclusions: Use of this standardized process significantly improved reperfusion times at this facility and also reduced process variation. It is noted that this improvement occurred even though the institution was already exceeding current AHA/ACC guidelines. Application of this adaptable systems-based approach at other institutions should be considered.

188  Emergency Department Patients Scheduled for Outpatient Stress Testing Have a Very Good Compliance Rate
Robin Naples, Chris Ghaemmaghami
University of Virginia

Objectives: Scheduled outpatient stress tests (SOSTs) after ED evaluations for possible acute coronary syndromes (ACS) allow for shorter ED stays and more frequent discharges home. Fears of noncompliance may discourage this delayed testing. Our objectives were to define noncompliance rates with SOST and to examine contributing factors. We hypothesize that pts are less likely to follow-up if they are uninsured or live in a location remote from our facility.
Methods: This was a retrospective cohort study of consecutive pts at a university hospital ED who were evaluated for possible ACS and referred for SOST from 1/2006 to 10/2007. Our primary endpoint was whether or not pts complied with SOST. Secondary endpoints were payer status, distance to hospital from pt’s residence, and time from ED visit to SOST. These data were obtained from our administrative data repository and manual chart review.

Results: Of 458 pts referred for SOST in the study period, only 46 pts (10%) were noncompliant. Indigent pts were less likely to comply than nonindigent pts (17.4% vs. 6.3% (p = 0.0004)). Odds ratios and 95% CI for non-compliance by payer status in relation to the entire group were: Medicaid 4.17 (1.63-10.7); self pay 1.42 (0.72-2.8); Medicare 0.94 (0.49-1.78); private insurance 0.47 (0.23-0.94). There was no decrease in compliance among pts living more than 20 miles from the hospital. The lowest compliance rates were in local pts (avg distance 0-20 miles) (OR 2.2, 95% CI 1.1-4.4). Noncompliance rates for SOST were highest at 2 days from the ED visit (OR 2.2, 95% CI 1.1-4.5) and lowest on the same day (OR 0.36 (95% CI 0.13 to 1.0)) or next day (OR 0.7 (95% CI 0.37 to 1.3)).

Conclusions: Payor status impacts compliance with SOST. The distance that a pt had to travel to return for SOST had a low impact. Plans for SOST in less than 2 days from the ED visit produced the best compliance. Improved compliance with SOST may be achieved by considering these factors while making out pt diagnostic plans.

Background: More than fifty-two million people or approximately 17% of the U.S. population today speak a primary language other than English. Language discordance between patient and physician is associated with health care inefficiencies, lack of patient compliance, provider and patient dissatisfaction, and overall undesirable health outcomes.

Objectives: This study sought to determine the identity and prevalence of languages spoken in the University of North Carolina (UNC) Hospitals’ emergency department (ED).

Methods: This cross-sectional study took place in the UNC Hospitals’ ED over an eight-month period from the fall of 2006 to the spring of 2007. We administered anonymous 21-item, closed-response surveys to patients either verbally or in written format as dictated by the patient. The survey included questions about the languages spoken by the patients and their interpretation needs in the ED. We analyzed the results using descriptive statistics. IRB approval was obtained.

Results: We surveyed 1000/1141 (87.6%) subjects. The majority were female (54.5%), Caucasian (38.0%), high-school educated (73%), and US born (90.2%), with average age of 45 years. Among non-native English speakers (9%), Spanish was the most prevalent primary language, followed by Chinese. A total of forty-four languages were represented in the ED. A minority (7.8%) of native English speakers reported communication difficulty with their physician, with most (56%) citing language as the cause; while 50.5% of non-native English speakers reported communication difficulty, with 97.8% citing language as the cause.

Conclusions: We found a wide spectrum of languages spoken by patients in the ED. Language discordance caused difficulty for a minority of English-speakers and for a large number of nonnative English speakers. As the United Sates becomes more diverse, EDs must plan for and address issues of language and communication to provide effective care.

Objectives: To determine whether non-English speaking (nEs) patients with acute ST-elevation myocardial infarction (STEMI) experience a systematic delay in time to reperfusion.

Methods: A retrospective review was performed at an urban teaching hospital for all adult patients seen in the ED for acute STEMI during a 22-month period (1/2006-10/2007). Patients treated with emergent thrombolysis or cardiac cath were included. Primary language spoken, demographics, time from door to lytics and door to cath-lab were collected. Patients with symptom onset > 6 hours, contraindications to reperfusion or refusal of care were excluded. Compliance with institutional goals for door to thrombolitics < 30 minutes or door to cath-lab < 60 minutes were reviewed. Mann Whitney U was used for continuous and chi-square for categorical data.

Results: 143 patients were evaluated for STEMI during a 22 month period. 17 patients were excluded due to symptom onset > 6 hrs, contraindication to reperfusion or refusal of care. 38 (30.2%) patients were nEs. There were no significant differences in age, arrival time or co-morbidities between groups. 106 (84.1%) patients had emergent cardiac cath. There was no difference in median time to cath-lab for English vs. nEs, (76.5 min [95% CI 66.7 to 104.8] vs. 90.0 min [95% CI 54.6 to 120.8], p=0.99). 20 (15.9%) patients were given emergent thrombolitics. There was no difference in median time to thrombolitics for English vs. nEs, (34.0 min [95% CI 24.5 to 45.6] vs. 32.0 min [21.8 to 47.8], p=0.69). Compliance with combined institutional goals for thrombolitics and time to cath-lab was similar for English vs. nEs (36.4% [95% CI 26.1 to 46.6] vs. 42.1% [95% CI 25.7 to 58.6] min, p=0.68).

Conclusions: There was no delay in time to reperfusion for non-English speaking patients in this population. Limitations included a retrospective design and small sample size.
Wide Variability in the Consent Process for Non-English Speaking Subjects

Adanna Ndubuizu, Seth Glickman, Samantha Phillips, Eugene Kim
Duke University

Introduction: Non-English speaking (NES) households comprise 19% of the latest US census data. Spanish speaking individuals are the fastest growing population in North Carolina and increasingly utilize the ED for health care. We recently reported that NES patients are under-enrolled in ED research studies and this discrepancy may impact the generalizability of trial results to the ED population.

Objectives: To examine the informed consent process for NES patients for clinical research studies at all academic medical centers in the US. Despite specific federal guidelines on NES consent, we hypothesize that there is wide variation in the consent process for these patients.

Methods: Blinded and trained abstractors using standardized forms and search engines identified IRB guidelines specific to NES consent at all Association of American Medical Colleges (AAMC) centers. Key processes evaluated included the need for translating consent documents, need for oral presenters, and availability of multiple options for consenting NES patients.

Results: 89 of 134 medical centers (66%) had policies specifically related to the enrollment of NES patients. 37 of 89 sites (41%) required both forward and backward translation of long consent forms. Only 3 sites (3%) provided an institutional service for translation of documents. 37 sites (41%) did not provide multiple options (i.e. verbal, oral) for the NES consent process, as recommended by federal guidance. On average, an additional 2.5 research personnel (including fluent translators, witnesses) per site would be required to comply with NES consent processes.

Conclusions: Despite federal guidance on NES consent, there is wide variation in procedures needed for consent of NES subjects. The associated costs and resources needed for NES consent can be quite high and could impact the inclusion of NES subjects in clinical research. Further study of the variability and impact of these NES policies on enrollment may be warranted, especially for studies of all-inclusive populations found in the ED.

Assessment of Return Visits within 72 Hours to a Pediatric Emergency Department Pre and Post Introduction of Rapid Assessment Times

Usha Sethuraman, Charles Eldridge, Nirupama Kannikesewaran, Xinguang Chen, Prashant Mahajan
Children’s Hospital of Michigan

Objectives: Data on return visits (RVs) in pediatric EDs are sparse. A rapid assessment program (29 minute guarantee) was introduced in our ED and guarantees that the patient will be seen by a physician within 29 minutes of arrival. We sought to assess RVs in our ED and to compare their length of stay (LOS) and admission rates between the pre (2004) and post (2005) 29 minute periods.

Methods: A retrospective analysis of children who presented to a pediatric ED within 72 hours of the first visit (FV) from January of 2004 to December of 2005 was done. Data were obtained, after systematic randomization, from charts and electronic databases. Demographic characteristics, diagnosis, disposition and LOS for both the FV and RV were noted using descriptive and comparative statistical methods.

Results: There was no difference in the RV rates between the two study groups (3.2% n 2004 versus 3.3% in 2005, p=0.32). A total of 1195 RVs were analyzed with 349 in the 2004 group and 846 in 2005 group. Of the RVs that were analyzed, 88% (1051/1194) were due to medical complaints. The overall LOS for the RV patients was significantly higher than the FVs LOS (181±141 minutes versus 141±118 minutes, p=<0.001). There was significant difference in the admission rates between the FV and the RV (FV= 69/1194 (5.8%) versus RV = 295/1194 (24.7%), p=<0.001). There was no difference between the two study years in the LOS, admission rates and overall RV rates (see table).

Conclusions: RVs rates, LOS and admission rates were not affected by the rapid assessment program. In our ED the RVs had a higher LOS and higher admission rates than FVs. RV 2004 n (%) 2005 n(%) p

Submersion and Drowning Accidents among Children Aged 0-4 Years-Old in Orange County California

Christopher Wall, Bharath Chakravarthy, Samuel Stratton
University of California, Irvine

Background: Recently enacted federal SafeKids legislation focuses on pool/spa safety and education as a means to decrease childhood drowning deaths in the U.S.

Objectives: To determine if submersion and drowning incidents decreased in Orange County in association with pool/spa safety legislation.

Methods: Retrospective, prevalence study of Health Care Agency submersion-drowning surveillance data for 0-4 year-old children in 1991-1992 and 2001-2004. Drowning surveillance data were also collected during 2004-2006. Original data were prospectively gathered, using defined elements from EMS, emergency departments and the Coroner with onsite review of each incident. U.S. Census Bureau data were used to help determine prevalences for the study period. Prevalence was calculated as number of cases per 100,000 per year. 95% confidence intervals were calculated for statistical comparison.
Results: 180,825 children aged 0-4 years resided in Orange County in 1990; 210,604 in 2000. In 1994, statewide pool safety building regulations were enacted requiring pool/spa safety fencing/gating. In 1999, a county ordinance was enacted that required stringent safety fencing and aggressive drowning prevention education. In 1991, submersion prevalence among 0-4 year-old children was 37.1 (CI = 28.7, 47.1), in 1992, 48.1 (CI = 38.5, 59.3) and during 2001 to 2004, 13.8 (CI = 7.7, 23.5). Drowning prevalence for 0-4 year-olds in 1991-1992 was 3.9 (CI= 1.6, 8.0); 2001-2004 was 3.0 (CI= 1.1, 7.1); and 2004-2006 was 2.7 (CI= 0.8, 6.0).

Conclusions: A significant decrease in 0-4 year-old submersions occurred between the early 1990s and 2000s. Paradoxically, during this time, there was less a decrease in drowning for this age group. This study suggests that pool/spa safety legislation and community education were associated with a decrease in submersion accidents, but that drowning is a more complex incident that requires further study and intervention.

194 Disparities in Child Pedestrian Crashes Using Geographic Information System (GIS) Data in a Large Southern California County
Bharath Chakravarthy, Craig Anderson, Shahram Lotfipour, Federico Vaca
University of California, Irvine

Objectives: To explore the relationship between personal and environmental determinants of child pedestrian crashes in a large economically and culturally diverse county in Southern California.

Methods: We identified police-reported crashes involving pedestrians age 12 on a public street or highway in Orange County, CA using data from the California Highway Patrol’s Statewide Integrated Traffic Records System (2000-04). Crash locations were geo coded. The relationship between population characteristics (US Census 2000) and child pedestrian crashes in each census tract was assessed using negative binomial regression controlling for population size. Rate ratios (RR) were calculated comparing the highest to the lowest quartile for each independent variable.

Results: The % of the population living in households with low income (185% of poverty level) was the strongest predictor of child pedestrian injuries (RR=8.8, 95%CI 4.2-7.3), the % who spoke English less than "very well" (RR=4.2,95%CI 3.2-5.5), % Hispanic (RR=4.2,95%CI 3.2-5.6), % Asian (RR=0.63,95%CI0.51-0.84), % households with 0 or 1 vehicle (RR=4.1,95%CI 3.1-5.4), % multifamily housing units (RR=2.7,95%CI 2.0-3.5), population density (RR=2.8,95%CI 2.1-3.6). The maximum traffic volume in/adjacent to the census tract was associated with a higher RR for the 2nd and 3rd quartiles (1.6 and 1.8), but not for the 4th quartile (1.3). The effect of these variables was diminished when low income was included in the regression and only the % of adults who had not completed high school, the % who spoke English less than "very well," % Asian, and traffic volume were still related to child pedestrian injuries.

Conclusion: Child pedestrian crashes are 9 times more frequent in poor neighborhoods. No other variable was as strongly related to child pedestrian injury.

195 Single Breath Counting: A Pilot Study of a Novel Technique for Measuring Pulmonary Function in Children
Syed Ali, Charles O’Connell, Lawrence Kass, Gavin Graff
Penn State Milton S Hershey Medical Center

Introduction: Peak Expiratory Flow Rate (PEFR) is the conventional way to measure asthma severity in adults, but is problematic in children because it is effort-dependent. Forced expiratory volume 1 second (FEV1) and the ratio of FEV1 to forced vital capacity (FEV1/FVC) are more accurate, but generally not available in the ED. Single breath counting (SBC) is the measurement of how far an individual can count in a normal speaking voice following a maximal effort inhalation. The count is in cadence to a metronome set at 2 beats per second. Previous work has suggested that SBC correlates with standard pulmonary function tests (PFTs) in adults. However, it has never been tested in children.

Objectives: This purpose of this pilot study was to ascertain if a correlation exists between SBC and PFT in a pediatric population.

Methods: This was a prospective observational study of a convenience sample of children presenting to a rural tertiary care university hospital for scheduled PFT. PEFR, FEV1, FVC, and FEV1/FVC were measured and recorded in standard fashion. After PFT, subjects were asked to perform SBC. Three attempts were allowed and the average was recorded. In order to correct for body size, the SBC was divided by height, weight, and age. Correlation was determined by Pearson coefficient.

Results: 47 children (median age: 12 years, 66% male) were enrolled. Indications for PFT included asthma and/or allergies (n= 31), cystic fibrosis (n= 6), and other chronic diseases (n= 10). The correlation of SBC to PEFR, FEV1, FVC, and FEV1/FVC were r = 0.74, 0.39, 0.28, and 0.34, respectively. All correlations were significant (p<0.05).

Conclusions: SBC correlates well with PEFR and moderately with other standard measures of pulmonary function. Though limited by study size and the lack of a validated method of correction for body size, it may be a promising tool for measuring asthma severity in children. Further study on an unselected ED population is indicated.
196  **Does Isolated Loss of Consciousness Predict Traumatic Brain Injuries in Children after Blunt Head Trauma?**

Nathan Kuppermann, James Holmes, Peter Dayan, John Hoyle, Shireen Atabaki, David Monroe, Michael Bachman, Fran Nadel, Todd Glass, Prashant Mahajan, Arthur Cooper, Rachel Stanley

*Lydia Dong, the PECARN TBI Study Group, University of California, Davis, Columbia University, DeVos Children’s Hospital, Children’s National Medical Center, Howard County General Hospital, Newark Beth Israel Medical Center, University of Pennsylvania, University of Cincinnati, Children’s Hospital of Michigan, Harlem Hospital Center, University of Michigan, University of Utah, PECARN*

**Background:** It is unclear if isolated loss of consciousness (i-LOC) is an appropriate indication for CT in children with blunt head trauma (BHT).

**Objectives:** To determine the association between i-LOC and traumatic brain injury (TBI) in children with BHT.

**Methods:** Design: A prospective observational cohort study of patients (pts) < 18 yrs with BHT and without underlying medical conditions in 25 EDs in a multicenter network between 2004-6. Observations: We evaluated the association of i-LOC with 1) TBI on CT and 2) TBI requiring acute intervention, defined by death, neurosurgery, intubation >24 hours, or TBI on CT in association w/ hospitalization 2 nights. If discharged from the ED, we performed phone follow-up or, if unavailable, medical record and morgue review. Hospitalized pts were followed. We defined i-LOC as a hx of LOC without other symptoms/signs of TBI.

**Results:** Of 57,158 eligible pts, 43,995 (77%) were enrolled, and 43,485 pts had no underlying medical illnesses. 6,847 (15.7%) had a hx of LOC (of whom 790 (11.5%) had i-LOC), 34,746 (79.9%) had no LOC, and 1892 (4.4%) had unknown LOC (Table). One (0.1%, 95% CI: 0, 0.7%) of 790 pts with a hx of i-LOC had TBI requiring acute intervention (neurosurgery for epidural hematoma). Review of this pt's medical record, how-ever, revealed headache not documented on the case report form, vomiting in the ED, and scalp hematoma on CT.

**Conclusions:** For children with isolated LOC after BHT, the risk of TBI is very small. Therefore, LOC should be considered in conjunction with other signs and symptoms when making decisions about CT use for children with BHT, but not drive the decision when it occurs in

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<th>Any LOC (N = 6,847)</th>
<th>No LOC (N = 34,746)</th>
<th>Isolated LOC (N = 790)</th>
</tr>
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<tbody>
<tr>
<td>Undergoing CT</td>
<td>5,545 (81%)</td>
<td>8,964 (25.8%)</td>
<td>465 (58.9%)</td>
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<tr>
<td>Positive CT</td>
<td>521 (9.4%)</td>
<td>471 (5.3%)</td>
<td>4 (0.9%)</td>
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<td>95% CI 6.6%</td>
<td>95% CI 4.8%</td>
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<td>10.2%</td>
<td>5.8%</td>
<td>2.2%</td>
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<td>TBI requiring</td>
<td>438 (6.4%)</td>
<td>195 (0.6%)</td>
<td>1 (0.1%)</td>
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<td>acute intervention</td>
<td>95% CI 6.8%</td>
<td>95% CI 0.5%</td>
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<td>(denominator is total N)</td>
<td>7.0%</td>
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197  **Interobserver Agreement in Assessment of Clinical Variables in Children with First Unprovoked Seizures**

Peter Dayan, Kathleen Lillis, Jonathan Bennett, Gregory Conners, Pam Bailey, James Callahan, Cigdem Akman, Neil Feldstein, W Hauser, Nathan Kuppermann

*Columbia University, College of Physicians & Surgeons, State University of New York at Buffalo, A.I. duPont Hospital for Children, University of Rochester, Baylor College of Medicine, SUNY Upstate Medical University, University of California, Davis, PECARN*

**Background:** In order to be generalizable, clinical variables used in guidelines and decision rules should show acceptable agreement when assessed by different observers.

**Objectives:** To determine the interobserver agreement of patient history and physical examination variables used to assess children undergoing emergency department (ED) evaluation for a first unprovoked seizure.

**Methods Design:** Prospective cohort study. Setting: Six academic, tertiary care EDs. Participants: Patients (pts) 29 days to 18 years of age evaluated for a first unprovoked seizure. We excluded pts if a precipitant was present (e.g. fever) or if previously evaluated for a seizure not induced by a precipitant. Procedures: Two clinicians independently completed a clinical assessment on a templated form on a convenience sample of enrolled pts. Some subjective variables (e.g., headache) were not evaluated in up to 83 children considered too young to assess. Assessments were performed within 30 minutes of each other and prior to neuro imaging. Agreement beyond chance was calculated for each clinical variable using the kappa statistic (k).

**Results:** Of 477 enrolled pts, 216 (45%) had interobserver agreement assessed (median age 53.5 months, w/ 38% < 2 years). Agreement beyond chance was at least moderate (k>0.41) for 20/31(65%) variables. Kappa was 0.41 for 8/11 (73%) general history, 7/7 (100%) seizure-specific history and 5/13 (38%) physical exam variables. Although kappas were mainly moderate, raw agreement was >80% for all history and physical exam variables, including 89% for all 12 neurological exam findings.

**Conclusions:** In children with first unprovoked seizures, observers often assess findings from pt history with at least moderate agreement beyond chance. This is less so for physical exam findings, suggesting that decision rules and clinical guidelines for evaluation of these children may be more reliable using findings from pt history.
Variation in Ancillary Service Utilization and Hospital Admissions in a Pediatric Emergency Department (PED)
Shabnam Jain, Michael DeGuzman
Emory University, Children’s Healthcare of Atlanta

Background: In the PED, physician practice patterns can impact resource utilization, throughput and revisits. Objectives: To evaluate variation in ancillary service utilization and admission rates by physicians in a tertiary care PED, and its correlation to outcomes.
Methods: We reviewed practice patterns of 36 PED physicians at our facility who saw > 1000 patients each over a 3 year period. Electronic medical record database for 167,171 eligible patient visits was abstracted for lab tests, imaging, IV therapy (IV fluids and antibiotics) for discharged patients and hospital admissions (ADM) for all patients. ED length of stay (LOS) and return to ED within 72hr (RR) were outcome variables. Data were stratified by triage acuity to adjust for illness severity and then adjusted for case mix. Individual physicians differential utilization from group mean and an overall utilization index (UI) were calculated. Pearson’s test was used for correlations.
Results: Severity adjusted utilization varied from 22.6-51.6% (median 36.6) for labs, 16.9-43.8% (median 25.5) for imaging and 9.2-21.1% (median 13.7) for IV therapy. Overall severity adjusted ADM rates varied from 16.8-30.2% (median 22.2), and within each triage level: non-urgent: 0-2.3%; urgent: 10.3-22.4%; emergent: 39.5-67.9%. UI was weakly correlated to ADM (r=0.33, p<0.05) and to LOS (r=0.33, p<0.05). RR was not correlated to UI (r=0.13, p>0.05). Excess resource use by high utilizers (>group mean) accounted for 4172 (11%) lab tests, 924 (6.4%) CXR, 613 (3.9%) KUB, 1161 (10.7%) IV for imaging and 92.3% (95%CI 62.1-99.6) with both factors had NBC. Among children < 5 yrs, 55.3% (95%CI 40.2-69.5) with either no or watery discharge on exam or absence of a glued eye in the morning had NBC, and 76.9% (95%CI 46.9-93.8) with both factors had NBC. Among children > 5 yrs, 75.0% (95%CI 60.1-85.9) with either eye itch or absence of glued eye in the morning had NBC, and 92.3% (95%CI 62.1-99.6) with both factors had NBC.
Conclusions: Our data suggest that older children are more likely to have NBC compared with younger children. The combination of age and specific clinical factors may help clinicians determine which children are more likely to have NBC, and limit unnecessary antibiotic treatment.

Predictors of Nonbacterial Conjunctivitis in Children
James Meltzer, Sergey Kunkov, Ellen Crain
Jacobi Medical Center

Background: Clinicians routinely treat conjunctivitis in children with antibiotics because of the reported high rate of bacterial etiology, as well as the difficulty distinguishing bacterial from nonbacterial causes. With increasing bacterial resistance to antibiotics, it is prudent to identify a population at low risk for bacterial conjunctivitis.
Objectives: To identify factors associated with nonbacterial conjunctivitis (NBC).
Methods: This was a prospective observational study of children 6 mos to 18 yrs who presented to an urban pediatric emergency department with conjunctival erythema and/or eye discharge. Exclusion criteria were eye trauma, contact lens use, and antibiotics use in the past 5 days. Clinicians completed a checklist of signs and symptoms and collected a conjunctival swab for bacterial culture. NBC was defined as normal skin flora or no growth from the culture. Chi-square and logistic regression were used for analysis.
Results: Of 169 patients enrolled, 91 (54%) were male. The mean age was 4.7 yrs (SD + 4.0); 62 (37%) were > 5 yrs. Overall, 94 patients (44.4%) had NBC. Children > 5 yrs were more likely to have NBC compared to children < 5 yrs (63% vs. 33%, p<0.001). In each age group, 2 clinical factors were significantly associated with having NBC. Among children < 5 yrs, 55.3% (95%CI 40.2-69.5) with either no or watery discharge on exam or absence of a glued eye in the morning had NBC, and 76.9% (95%CI 46.9-93.8) with both factors had NBC. Among children > 5 yrs, 75.0% (95%CI 60.1-85.9) with either eye itch or absence of glued eye in the morning had NBC, and 92.3% (95%CI 62.1-99.6) with both factors had NBC.
Conclusions: Our data suggest that older children are more likely to have NBC compared with younger children. The combination of age and specific clinical factors may help clinicians determine which children are more likely to have NBC, and limit unnecessary antibiotic treatment.

VeinViewer Assisted Intravenous Catheter Placement in the Pediatric Emergency Department
Laura Chapman, Bruce Becker, Susan Duffy, Michael Hoe, Kelly O’Hear
Rhode Island Hospital, Warren Alpert School of Medicine at Brown University, Brown University

Objectives: To evaluate the effectiveness of the Vein-Viewer (VV) for the placement of intravenous (IV) catheters in children treated in a pediatric emergency department (PEM). The VV projects near infrared light delineating subcutaneous veins.
Methods: Prospective, randomized controlled clinical study approved by the IRB. Research Assistants (RAs) enrolled a convenience sample of sub-critical, English speaking children aged 8-17 years-old requiring an IV in an urban PEM. RAs randomized participants to standard IV cannulation (SC) or IV cannulation with the VV after informed consent was obtained, collecting demographics and outcome measures including time to IV placement, number of attempts to success and children’s pain and parent/guardian and nurse perception of child’s pain using a 100mm visual analog scale (VAS). Data Analysis: Demographics were compared between each group using 2-sample t-tests and a chi-square test. Outcome variables were analyzed using a one-way ANOVA test. Equal variance and normal distribution between the two groups were determined prior to ANOVA analysis.
Results: 56 patients of the planned 100 have been enrolled: 26 males and 30 females. Age, gender, sex
and BMI were not different between groups. This interim analysis revealed trends favoring the VV but no significant results. Time to IV placement: 127 seconds (VV) vs. 209 seconds (SC) (p < 0.29, 95% confidence interval [CI] 94 to 248); number of punctures: 1.08 (VV) vs. 1.17 (SC) (p < 0.481, CI 1.0 to 1.25); mean patient pain: 24.68 (VV) vs. 31.53 (SC) (p < 0.309, CI 21.7 to 35); mean parents’ perception of their child’s pain: 22.69 (VV) vs. 25.76 (SC) (p < 0.602, CI 18.5 to 30); and mean nurses’ perception of the child’s pain: 25.23 (VV) vs. 24.3 (SC) (p < 0.845, CI 20 to 29).

Conclusions: The VV group demonstrated trends toward a decreased time to successful IV placement, number of IV attempts, and child and parent pain perception.

(Originally submitted as a “Late-Breaker”)

201 Vein ViewerTM for Peripheral Intravenous Access: A Randomized Controlled Trial

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Background: Intravenous (IV) access is a common procedure in most pediatric patients in the emergency department (ED) and may often require multiple attempts. Vein Viewer TM is an alternative method for IV placement. There have been no published reports of the use of Vein Viewer TM for peripheral IV access.

Objectives: To evaluate the rate of successful first IV attempts and time to cannulation with the Vein Viewer TM guided technique.

Methods: A randomized clinical trial comparing Vein Viewer TM guided peripheral IV access with the traditional method. All stable pediatric ED patients requiring IV access were eligible. After informed consent, patients were randomized to either IV access through the Vein Viewer TM method or the traditional method. Successful cannulation was defined as either blood return or successful flushing with IV fluids. We allowed for technique cross-over after 2 failed attempts. We calculated sample size of 400 patients allows an 80% power to detect a 10% increase in successful 1st IV attempts. Groups were compared with related non-parametric tests.

Results: We enrolled 117 patients over a three month period. 57 patients were randomized to the Vein Viewer TM group and 60 patients to the traditional group. First attempt IV access in the Vein Viewer TM group was 61% (34/56), compared to 63% (36/57) in the traditional group (p = 0.79). The mean time to successful cannulation was 7.85 minutes (SD 8.23, CI 5.6 to 10.10 minutes) in the Vein Viewer TM group compared to 8.76 minutes (SD 11.02, CI 5.75 to 11.77 minutes) in the traditional group.

Conclusions: The Vein Viewer TM guided peripheral IV cannulation did not decrease the time to successful cannulation nor did it increase the first attempt success rate. The Vein Viewer TM method being as effective as the traditional method may find a role in settings with personnel less skilled in pediatric IV placement or potentially difficult IV placement.

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202 Providers Do Not Verify Patient Identity during Computer Order Entry

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Introduction: Medical error is the 6th leading cause of death. To reduce errors, the Joint Commission created National Patient Safety Goals. One goal is to improve the accuracy of patient identification (ID) by using 2 identifiers (i.e., name, date of birth (DOB), or medical record number (MRN)).

Objectives: To determine the frequency of verifying patient ID by emergency providers during computer provider order entry (CPOE).

Methods: Prospective, simulated scenarios with an eye tracking device that showed exactly what the provider was looking at. Medical providers were asked to review 10 triage charts (scenarios), select the patient from a computer alphabetical list and order tests on a second screen; both screens contained patient ID information. Two scenarios had embedded ID errors compared to the computer (1 with incorrect DOB and 2nd with misspelled last name) and a 3rd had the potential for an ID error (2nd patient on alphabetical list with the same last name and similar first name). Providers were not aware that the focus of the study was patient ID. Verifying patient ID was defined as looking at name and either DOB or MRN on the computer screen.

Results: 25 providers participated. One hundred percent (95% CI 86%, 100%) selected the correct patient in the computer list that had another patient with the same last name. Two of 25 (8%, 95% CI 1%, 26%) noted the DOB error; the remaining 23 ordered tests on an incorrect patient. One of 25 (4%, 95% CI 0%, 20%) noted the last name error; 12 ordered tests on an incorrect patient. No provider verified patient ID by looking at MRN prior to selecting the patient from the alphabetical list (0/107, 95% CI 0%, 3%). Patient ID was verified 23% of the time prior to ordering tests (45/200, 95% CI 17%, 29%). Even when 2 identifiers were looked at, the embedded error was detected only 25% of the time (2/8, 95% CI 3%, 65%).

Conclusions: Medical providers often miss ID errors and infrequently verify patient ID with 2 identifiers during CPOE.

203 Development and Function of a Real-Time Web-Enabled Screening System for Emergency Department Patients with Septic Shock

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Background: Sepsis can be difficult to identify in a busy ED. An automated real-time screening system to alert clinicians to patients with occult septic shock might be useful to initiate goal-directed therapy.