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2016 ICEP
Spring **SYMPOSIUM**
& ANNUAL BUSINESS MEETING



CRITICAL CARE MEDICINE: Implications for Practicing Emergency Physicians

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A Descriptive Analysis of Ventricular Assist Device Patients Presenting to an Urban Academic Emergency Department

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Background:

The number of advanced heart failure patients treated with a left ventricular assist device (LVAD) is increasing with over 10,000 device implantations to date. Despite this growing population, little is known about how these patients present to the emergency department.

Objective:

To characterize the ED presentation of LVAD patients in search of themes in epidemiology, evaluation and management that may highlight successful practices as well as areas for improvement in caring for this patient population.

Design/Methods:

A retrospective chart review was completed for all (143) institutional LVAD patients presenting to the ED over a 5-year period between July 1, 2009 and June 30, 2014. Two abstractors reviewed all ED encounters for chief complaint, ED and hospital course, diagnosis and disposition.

Results:

A total of 620 ED encounters were identified. Of these, 431 (70%) resulted in admission, 187 (30%) resulted in discharge, 1 left against medical advice, and 1 left without being seen. Among all encounters 182 (29%) presented with bleeding problems (e.g. gastrointestinal bleeding, epistaxis), 127 (20%) had infections (e.g. bacteremia, driveline infection), 68 (11%) had heart failure exacerbations, and 36 (6%) had an arrhythmia or implantable cardioverter-defibrillator (ICD) fire (see Figure 1). Only 52 encounters (8%) ultimately had LVAD-specific issues. Of these, presenting symptoms were abnormal LVAD readings/alarms in 36 patients, grossly damaged LVAD equipment in 2 patients, and nonspecific complaints in 13 patients. All 13 patients with nonspecific complaints and 10 patients with abnormal device readings were diagnosed with pump thrombosis. LVAD-specific treatments included hardware exchange in 10 patients and adjustment of device settings in 3 patients. No patients required CPR and no patients died in the ED.

Conclusion:

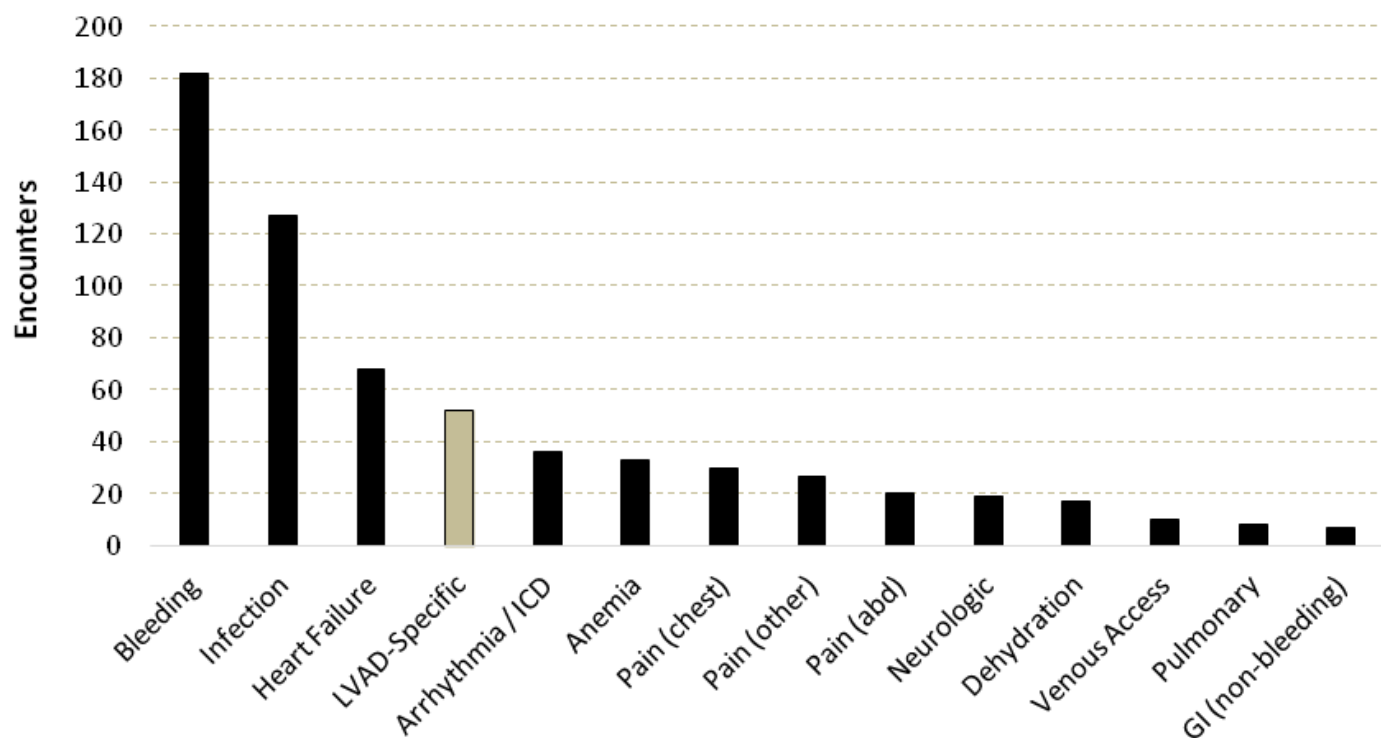
Greater than 90% of LVAD patient presentations to the ED were unrelated to device function and were managed using traditional techniques. Care for LVAD-specific complications requires familiarity with interpreting LVAD readings and recognition of LVAD thrombosis.

Impact:

LVAD patients often present to their closest ED & community physicians need to be comfortable triaging this complex population. Our study shows the care for a majority of LVAD encounters fall within the scope of EM-trained physicians, but a small subset will still require definitive care at a specialized VAD transplant site.



Figure 1: LVAD ED Encounters by Category





Evaluation of Medical Management of Pediatric Patients with Suspected Sepsis During Emergency Transport by a Pediatric Transport Team

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Background: Evidence-based practices for pediatric sepsis care exist, and studies show early implementation of goal-directed therapy improves outcomes in children with sepsis. Adult studies show use of sepsis screening tools in prehospital settings improves identification of sepsis, enabling earlier appropriate therapies and leading to improved outcomes. Similar studies in pediatrics evaluating need for transport teams to use screening tools have not been performed.

Objective: Determine whether pediatric transport teams appropriately identify sepsis in pediatric patients and provide proper, timely therapies per accepted guidelines.

Design/Methods: Retrospective chart review of all children (0-18 years) transported to our hospital by a pediatric transport team from 1/1/2014-12/31/2014. Records were reviewed for high-risk conditions, vital signs/exam findings (initial evaluation and upon arrival), interventions, clinical status changes, and discharge diagnoses. Retroactively applying a pediatric sepsis screening tool, we determined if these patients screened positive for clinical signs of sepsis at initial evaluation by transport team and/or upon arrival and if those who screened positive received guideline-based interventions.

Results: 246 of 562 patients considered met inclusion criteria. 44 screened positive for sepsis at initial transport team evaluation. Of these, 91% received IVFs (72% received IVF bolus); only 68% received antibiotics and 45% had diagnosed sepsis. 202 patients did not meet sepsis criteria at initial evaluation, however some evaluations were missing vitals or exam findings needed to fully apply the screening tool. Of these 202 patients, 3 had diagnosed sepsis.

Conclusion: A significant percentage of patients transported by a pediatric transport team would have screened positive for suspected sepsis at initial evaluation and did not all receive recommended therapies per PALS guidelines. Use of maintenance instead of bolus fluids occurred, but correct fluid resuscitation was more common than timely antibiotic administration. It is possible that providers in these cases did not recognize pediatric sepsis and/or were unfamiliar with pediatric sepsis management guidelines.

Impact: Prehospital emergency transport represents a crucial, time-sensitive opportunity for recognition and management of suspected sepsis in pediatric patients. Given our results, we recommend use of a sepsis screening and management tool by transport teams to assist in early identification and treatment of pediatric sepsis.



Ultrasound for Confirmation of Thoracostomy Tube Placement by Emergency Medicine Residents

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Background:

Thoracostomy tubes (TT) are placed in patients for numerous indications, including hemothoraces, pneumothoraces, and empyemas. Studies have demonstrated that up to 2.6% of TT are misplaced in the subcutaneous tissue. Hence, there has been increasing interest in the use of bedside ultrasound (US) to confirm intrathoracic TT placement. Two small prior studies of expert physician sonographers reported good success.

Objective:

The purpose of this study was to assess the accuracy of novice physician sonographers for the confirmation of intrathoracic TT placement.

Design/Methods:

We conducted a prospective, randomized, blinded study as part of an annual spring Emergency Medicine (EM) resident cadaver procedure workshop. IRB acknowledgement was obtained for this educational study. Each EM resident received a ten-minute, one-on-one training session with the Emergency US Director that began with a hands-on review of thoracic sonographic anatomy, followed by two plane, intra- and extra-thoracically placed TT identification instruction, and practice. Then, each EM resident performed four blinded US confirmations. Thirty-five EM residents performed a total of 140 confirmations. The primary outcome of the study was the sensitivity and specificity of EM resident performed US to correctly confirm intrathoracic TT placement. Secondary outcomes included time to identification, operator confidence, and subgroup analysis of sensitivity and specificity by resident training level.

Results:

The study demonstrated an overall sensitivity of 100% (95% CI 94%-100%) and specificity of 96% (95% CI 87%-99%) for intrathoracic placement. Post-graduate year (PGY) 1 EM residents demonstrated 100% (95% CI 76%-100%) sensitivity and 100% (95% CI 76%-100%) specificity. PGY 2 EM residents demonstrated 100% (95% CI 87%-100%) sensitivity and 94% (95% CI 79%-99%) specificity. PGY 4 EM residents demonstrated 100% (95% CI 80%-100%) sensitivity and 95% (95% CI 75%-100%) specificity. The mean time to identification was 16 seconds (95% CI 13-19). Overall operator confidence was 4.0/5.0 (95% CI 3.8-4.1).

Conclusion:

Emergency medicine residents were able to rapidly identify TT location using US with a high degree of accuracy in a cadaveric model after a brief training session. Further studies are needed to assess the utility of US for confirmation of TT location in cadavers of various body sizes as well as live patients.

Impact:

Given the significant potential for morbidity and mortality with improperly placed TT in sick patients, this allows for rapid identification and correction of improperly placed TT. Additionally, this may reduce patient radiation exposure.



Psychiatric Patient Length of Stay in the Emergency Department Following Closure of a Public Psychiatric Hospital

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Background:

While other studies have analyzed the effect of psychiatric patient boarding in the Emergency Department (ED) on ED crowding, patient care and expenses, no studies to date have investigated the effect on psychiatric patient ED length of stay (LOS) after closing a nearby psychiatric facility.

Objective:

To identify the effect of closing a public psychiatric facility in a major metropolitan area on the ED LOS of psychiatric patients.

Design/Methods:

An observational multicenter cohort study of patients requiring inpatient psychiatric hospitalization was performed. The insurance status, accepting facility type and times of arrival, disposition, and transfer were collected. A two-sample t-test was used to analyze boarding times before and after the public psychiatric hospital closure.

Results:

There was a statistically significant increase in the overall ED LOS of psychiatric patients following the closure of the mental health facility ($t=23.7$, $P<0.0001$) with a mean ED LOS of 238.6 minutes (± 204.4) prior to, and 854.5 minutes (± 586.1), after the closure. Psychiatric patients with private medical insurance had a mean ED LOS of 297.9 minutes prior to closure and 465 minutes after closure ($t=-2.530$, $P=0.012$). Medicare/Medicaid patients spent a mean of 416.9 minutes before and 450.4 minutes after closure ($t=-2.087$, $P=0.037$). Patients transferred to a private psychiatric hospital spent a mean of 452 minutes prior to, and 558.8 minutes after closure ($t=-3.086$, $P=0.002$). Patients transferred to an existing public psychiatric hospital spent an average of 1390.9 minutes in the ED prior to closure and 1449.7 minutes after closure, however this was not statistically significant ($t=-.602$, $P=0.548$).

Conclusion:

Overall there was an average of a 3.5 times increase in LOS for psychiatric patients following the closure of a public mental hospital. There was also an increase in LOS of Medicaid/Medicare and privately insured patient groups following the closure.

Impact:

This study highlights the impact of closing a single inpatient psychiatric facility. This brings attention to the need for increased psychiatric services during a time when there is a nationwide trend towards the reduction of available inpatient psychiatric beds.



Pharmacological Induction of Torpor/Hypothermia as a Strategy for Improving Post Cardiac Arrest Outcomes

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Background:

Post-cardiac arrest hypothermia and targeted temperature management have been shown to improve survival in patients following cardiac arrest resuscitation. Despite the effectiveness of hypothermia, the ideal degree and timing of cooling is unknown. In addition, there are barriers to the induction of hypothermia in the out of hospital and critical care settings, potentially limiting its effectiveness and use. Hypothermia can also be induced by the inhibition of metabolism. This strategy, known as torpor, is used by some small species of animals in order to increase their survival during periods of environmental. Recently, torpor induction has been demonstrated to be mediated by elevated levels of circulating 5'adenosine monophosphate (5'AMP).

Objective:

To determine if 5'AMP injection rapidly induces torpor/hypothermia in mice and to assess its effects on post cardiac arrest outcomes including myocardial function and survival.

Methods/Results:

C57BL/6 wild type mice injected intraperitoneal with 0.5 mg/g or 0.7 mg/g 5'AMP demonstrated a rapid lowering of core body temperature from 37°C to 32°C within 20 minutes and reached a nadir of 28°C by 60 minutes. The duration of this effect was dose dependent lasting 2.5 hours (0.5 mg/g) and 3.5 hours (0.7 mg/g). Mice remained awake, but were lethargic during this time, showed no ill effects, and completely recovered following treatment. Next, we tested 5'AMP pre-treatment in a murine model of asystolic cardiac arrest. Anesthetized and ventilated adult female C57BL/6 wild-type mice were injected 30 min prior to cardiac arrest with 5'AMP or PBS (control). Mice underwent a 12 min KCl-induced cardiac arrest followed by cardiopulmonary resuscitation. 5'AMP (0.5mg/g) treated mice demonstrated improved myocardial function (%Fractional Shortening (%FS), $50 \pm 3\%$ vs. $28 \pm 3\%$) and increased survival (100% vs. 50% at 2 hours, $n=10$, $p<0.01$). 5'AMP also improved myocardial function and survival when administered at the time of cardiopulmonary resuscitation.

Conclusion / Impact:

The induction of torpor/hypothermia by 5'AMP is rapid, reversible and benign. Torpor induction prior to or during cardiac arrest improves post-cardiac arrest outcomes and is a promising novel therapeutic strategy.



Development and Assessment of a Simulation Model of Ongoing Professional Practice Evaluations

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Background:

Evaluation of procedural skills of practicing physicians has been required by the Joint Commission since 2009, a process known as the Ongoing Professional Practice Evaluation (OPPE). Several methods have been used to assess these skills, including chart review and verbal assessment of the steps to perform a procedure. However, for many medical procedures, these methods do not allow for regularly scheduled objective evaluation.

Objective:

The purpose of this study was to compare simulated procedure performance assessment to verbal procedural performance assessment.

Design/Methods:

Study participants were practicing Emergency Medicine physicians. Seventeen of 26 eligible physicians consented to take part in the study. Two simulated scenarios were developed to assess skill in placing triple lumen central catheters (CL) and in performing a lumbar puncture (LP). Each participant completed both procedures using a simulation and verbal assessment technique. Emergency Physician simulation expert raters utilized previously validated checklists for each procedure, and provided a global assessment of their confidence that the physician was capable of performing the procedure proficiently.

Results:

Participants correctly completed more checklist items on the simulation-based technique (CL simulation 83% vs verbal 69%, $p < 0.001$; LP simulation 86% vs verbal 76%, $p < 0.001$). In addition, the simulation based assessment had fewer "unable to observe" items (CL simulation 0% vs verbal 14%; LP simulation 0% vs verbal 5%). Participants above the average score in this study were more likely than those below average (BA) to be rated a "5" or "very confident" on their ability to safely and correctly perform the procedure (CL simulation 88% vs 67% of BA; CL verbal 62% vs 44% of BA; LP simulation 100% vs 67% of BA; verbal 100% vs 80% of BA).

Conclusion:

Our data suggests that a simulation based assessment technique may provide a more accurate assessment of ongoing physician competence in medical procedures than verbal assessment. Additionally, above average checklist performance appears to correlate with higher expert rater confidence regarding physician proficiency.

Impact:

Using a simulated setting for assessment may provide a better assessment of physician proficiency in the same environment where remedial training may be immediately provided.



Rapid Response Team Alerts within 24 Hours of Emergency Department Admission: An Analysis of Patients Who Survived Versus Died

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Background:

A Rapid Response Team (RRT) is a multidisciplinary strategy to improve identification of clinical deterioration and to subsequently decrease the incidence of in-hospital cardiopulmonary arrest. Debate exists about the effectiveness of these systems to improve outcomes, but newer applications have indicated utility as a quality improvement tool.

Objective:

We analyzed patients following an RRT event called within 24 hours of ED admission to identify factors associated with those who died versus those who survived. Identification of patients who are at high risk of clinical decompensation could assist providers in determining appropriate level of care.

Design/Methods:

A single center retrospective review was conducted of all patients admitted through an urban academic emergency department who had an RRT called within 24 hours of admission from November 1, 2012 through March 31, 2015. We compared RRT patients who died versus those who survived across multiple clinical elements. Variables included time of arrival, initial vital signs (temperature, heart rate, respiratory rate, blood pressure, oxygen saturation), presenting complaint, and ED length of stay. Descriptive statistics and Fisher's exact tests were performed using SAS Version 9.3.

Results:

Of 29,503 patients admitted through the ED during the study period, 67 patients had an RRT called within 24 hours of admission (0.2%). ED RRTs represented 33% of all RRTs called within 24 hours of admission (206) during the study period. Descriptive statistics on the patient population can be seen in Table 1. Ten ED RRTs (15%) resulted in patient death. Abnormal triage oxygen saturation ($SpO_2 < 92\%$) was the only characteristic with a statistically significant ($p=0.04$) association with death for patients who had an RRT called.

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Table 1. Descriptive Characteristics- Patients Who Survived vs. Died

	Survived, N=56	Died, N=10	Total	p-value
Age in Years, Mean (SD)	55.9 (18.8)	58.3 (20.1)	56.2 (18.9)	0.710
Female	53.6%	40.0%	51.5%	0.505
African American Hispanic	46.4% 33.9%	70.0% 20.0%	50.0% 31.8%	0.584
Time of Arrival: • 0601-1200 • 1201-1800 • 1801-0000 • 0001-0600	25.0% 46.4% 14.3% 14.3%	30.0% 20.0% 40.0% 10.0%	25.8% 42.4% 18.2% 13.6%	0.193
Abnormal Triage Vital Signs: • Temperature (<36, >38) • Heart Rate (<60, >100) • Respiratory Rate (<12, >20) • Systolic Blood Pressure (<90, >180) • Oxygen Saturation (<92%)	20.4% 42.9% 45.5% 21.4% 5.4%	25.0% 70.0% 40.0% 30.0% 30.0%	21.0% 47.0% 44.6% 22.7% 9.1%	0.670 0.171 0.750 0.683 0.040
Total # Abnormal Triage Vital Signs, Mean (SD)	1.3 (1.0)	1.9 (1.1)	1.4 (1.1)	0.127
Length of Stay in Minutes, Mean (SD)	393.2 (202.0)	418.0 (185.0)	396.9 (198.4)	0.718
Common Chief Complaints: • Shortness of Breath • Neurological • Chest Pain • Abdominal Pain	25.0% 25.0% 14.3% 8.9%	30.0% 20.0% 10.0% 30.0%	25.8% 24.2% 13.6% 12.1%	0.709 0.730 0.710 0.095

Conclusion:

Based on this study, abnormal triage oxygen saturation was the only significant difference between those patients who survived and those who died. Further analysis is needed to delineate characteristics of patients who have RRTs compared to those who do not in order to detect predictors of poor outcomes.

Impact:

Identifying and quantifying predictors could be used to derive a clinical decision rule alerting EM physicians and admitting services of patients who may require disposition to a higher level of care.



Electronic Best Practice Advisories (BPAs) Effectiveness in Detecting Sepsis in the Emergency Department

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University of Illinois College of Medicine at Peoria, Peoria, IL

Background:

The incidence of severe sepsis is 750,000 cases per year in the U.S. and Canada, causing significant morbidity and mortality. Current guidelines from the Surviving Sepsis Campaign (SSC) recommend administering appropriate antibiotics within the first 3 hours of recognition of severe sepsis and septic shock; delayed antibiotic treatment is associated with increased morbidity. Best Practice Advisories (BPAs) are reminder tools within the Epic® electronic health record (EHR) system that provide clinical decision support. This study aims to evaluate if BPAs are effective at detecting potentially septic patients in an ED setting.

Objective:

A structured retrospective review of medical records was conducted at an academic urban emergency department (annual visits >85,000) of patients who initially met systemic inflammatory response syndrome (SIRS) criteria after an electronic BPA was implemented (March 1-30, 2014 and the first 7 day monthly period of April 1-September 30, 2014). The BPA Sepsis Risk Scoring System was created based on the Surviving Sepsis Campaign (SSC) guidelines and guided by the Detecting and Treating Sepsis manual from Epic® Systems. A score >2.5 meant that a patient met SIRS criteria, is potentially septic, and triggered the BPA. The definitive diagnosis of sepsis for ED SIRS visits was based upon final diagnostic related group (DRG) coding and further established by imaging modalities, urinalysis, and physical exam findings on chart review. BPAs' sensitivity, specificity, PPV, NPV was calculated and 95% confidence intervals (CI) established.

Results:

Over the course of the study period, 13,906 records were screened, 565 BPAs fired and 313 cases of sepsis were confirmed (2.3% prevalence). The BPAs' sensitivity and specificity was 74.5% (95% CI=69.2–79.1%) and 97.6% (95% CI=97.3–97.8%) respectively, with positive and negative predictive values of 41.2% (95% CI=37.2–45.4%) and 99.4% (95% CI = 99.3–99.5%) respectively. The BPA's positive and negative likelihood ratios (LR) (weighted for prevalence) were 0.70 (95% CI=0.62–0.79) and 0.006 (95% CI=0.005–0.008). No significant changes were noted in the BPA sensitivity or specificity when confined to severe sepsis or septic shock.

Conclusion:

BPAs were an effective EHR-based tool that detected potentially septic patients with moderate sensitivity and high specificity in our ED. The test's high negative LR and negative predictive value make it valuable in excluding sepsis as differential diagnosis in a general ED population. Future directions for follow-up studies include cost analysis, morbidity/mortality studies, and multicenter comparisons of other quality metrics that can be improved by having a system such as BPA that reduces time to appropriate medical intervention.



Effect of Emergency Department Nursing Shortage on Emergency Department Throughput Metrics

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Background:

Patient encounter length of stay (LOS) remains an imperative component of delivering quality care in the emergency department (ED). The role of nursing hours on ED patient LOS remains nebulous and studies have shown conflicting results. Our hospital is a tertiary care, safety-net hospital with 254 medical/surgical inpatient beds and 80 ED beds that experienced an ED nursing shortage from 4/1/15-8/4/15. We hypothesize that decreased nursing staffing hours adversely affected ED LOS metrics; namely, door-to-discharge LOS, door-to-admit LOS, and rate of patients that left without being seen (LWBS).

Objective:

To further define the effect of nurse staffing on ED throughput.

Design/Methods:

Electronic hospital records (EHR) of 105,887 ED visits were retrospectively queried from January 1, 2015 to December 31, 2015. This EHR was collected in conjunction with daily nurse staffing hours, which was gathered from nurse staffing records over the same time period. The influence of ED nursing hours on important ED LOS metrics was evaluated using analysis of covariance. Total daily ED volume served as the covariate for all models. A binary variable that reflects nursing hours above-mean or below-mean was created and used as the fixed factor. ED patients' daily door-to-discharge LOS, door-to-admit LOS, and the rate of LWBS were used as the dependent variable in each model, respectively. SPSS Univariate GLM procedure was utilized for all analyses.

Results:

While controlling for total daily ED volume, nursing hours have a significant effect on the door-to-discharge LOS, $F(1, 361)=8.15, p < .001$ and the daily LWBS, $F(1, 362)=72.15, p < .001$. When comparing days with below-mean nursing hours to above-mean nursing hours, the door-to-discharge LOS increased by 19.5 minutes. LWBS increased by 6.6 patients per day. Door-to-admit LOS, however, did not appear to be significantly affected by nursing hours.

	ED LOS for Discharged Pts	ED LOS for Admitted Pts	LWBS
Nursing Hours Below Median	258.9 minutes (95% CI 253.8-264.0)	443.4 minutes (95% CI 431.6-455.3)	20.7 patients (95% CI 19.7-21.7)
Nursing Hours Above Median	239.4 minutes (95% CI 234.2-244.7)	439.5 minutes (95% CI 427.3-451.7)	14.1 patients (95% CI 13.1-15.2)

Conclusion:

Based on the analysis, nursing hours appear to have a significant impact on some ED LOS metrics, namely door-to-discharge LOS and LWBS. Further research is necessary to better understand the intricacy of the multiple factors that contribute to ED LOS.

Impact:

Ours is the first study to objectively demonstrate the significant impact of nursing hours on ED throughput and efficiency.



Supplemental Milestones for 48-Month Emergency Medicine Residency Programs: A Validation Study

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Background:

Emergency Medicine (EM) residency programs may be either 36 months or 48 months in length. The Residency Review Committee for EM requires that 48-month programs provide educational justification for the incremental 12 months. We developed additional milestones that 48-month programs might use to define and assess outcomes in domains that meet this accreditation requirement.

Objective:

This study aims to validate these proposed supplemental milestones using a similar methodology to that established by the original EM Milestones validation study.

Design/Methods:

A panel of EM program directors and content experts at two institutions identified content domains for additional training offered by many 48-month EM programs. This led to the development of 6 novel subcompetencies: Operations and Administration, Critical Care, Leadership and Management, Research, Teaching and Learning, and Career Development. Subject-matter experts at other 48-month EM residency programs refined the milestones for these subcompetencies. Program directors of all 48-month EM programs were then asked to order the proposed milestones using the Dreyfus model of skill acquisition for each subcompetency. Data analysis mirrored that used in the original EM milestone validation study, leading to the final version of our supplemental milestones.

Results:

Sixteen of 33 subjects (48.5%) completed the study. No subcompetency or individual milestone met deletion criteria. Of the 97 proposed milestones, 61 (62.9%) required no further editing and remained at the same level as proposed by the study authors. Thirty-five milestones underwent level changes: 15 (15.5%) were moved one level up and 18 (18.6%) were moved one level down. One milestone (1.0%) in 'Leadership and Management' was moved two levels up, and one milestone in 'Operations and Administration' was moved two levels down. One milestone in 'Research' was ranked by the survey respondents at one level higher than that proposed by the authors, however this milestone was kept at its original level assignment.

Conclusion:

Six additional subcompetencies were generated and validated among a cohort of 48-month program directors using the same methodology as was used to validate the current EM Milestones. These optional milestones may serve as an additional set of assessment tools that will allow 48-month programs to report educational outcomes using a familiar milestone rubric.

Impact:

These supplemental milestones may be used for self-study by 48-month Emergency Medicine residency programs in preparation for internal review. Alternatively, the methodology used here demonstrates a means by which individual programs can create validated tools to track the effectiveness of their own educational goals and objectives.



Emergency Medicine Trainee Wellness is Associated with Higher In-Training Examination Scores

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Background:

Resident physicians experience low levels of wellness during training. Emergency medicine (EM) trainees report some of the highest levels of burnout among all specialties. EM trainee distress is associated with higher self-reported rates of negative patient care. It remains unclear if low levels of EM trainee wellness are also associated with poorer academic performance.

Objective:

We examined the relationship between EM trainees' levels of wellness and their American Board of Emergency Medicine (ABEM) in-training examination percentile scores. We hypothesized that lower levels of trainee wellness would be associated with lower scores.

Design/Methods:

In this cross-sectional survey study conducted in October 2015 we assessed levels of wellness among all post-graduate year 1-4 EM trainees at a single university-based residency program. Our primary measure of burnout was determined and dichotomized using the Maslach Burnout Inventory. Secondary measures of work engagement, quality of life, depression, career satisfaction and daytime sleepiness were evaluated using standard instruments. These results were compared to trainees' 2015 ABEM in-training percentile scores via independent samples t-test and linear regression.

Results:

Thirty-six out of 54 (66.7%) eligible trainees responded to the survey, with 27 (75.0%) reporting burnout. Excluding interns without available 2015 in-training exam scores, the mean percentile score for the remaining 23 out of 54 participants was 74.6% (SD \pm 24.7). Burnout was significantly associated with lower exam percentile scores [66.9% vs 88.9%, 95% CI (1.20, 42.67), $p=0.04$]. Increased levels of work engagement [$\beta=0.43$, CI (0.78, 30.24), $p=0.04$] and quality of life [$\beta=0.53$, CI (0.16, 1.11), $p=0.01$] were positively associated with higher exam scores. Depression, career satisfaction and daytime sleepiness were not significantly associated with exam scores.

Conclusion:

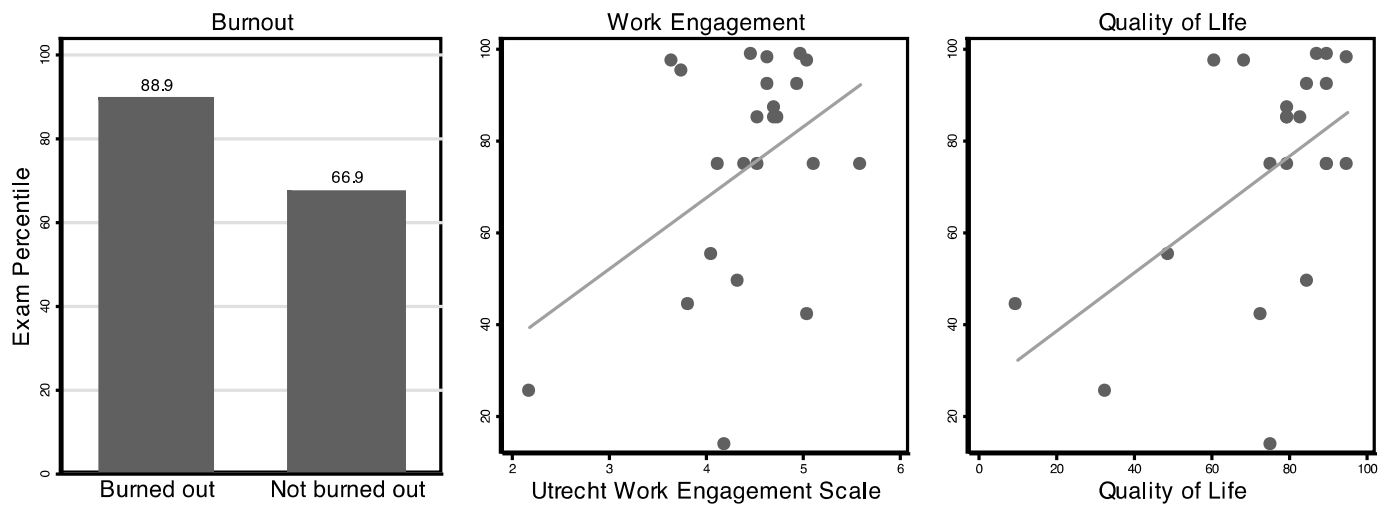
Absence of burnout and higher levels of EM trainee work engagement and quality of life were associated with higher in-training exam percentile scores. We did not find significant associations between depression, career satisfaction and daytime sleepiness with in-training exam scores, but these results may have been limited by the study's small sample size.

Impact:

Absence of burnout, increased work engagement, and increased quality of life are all associated with higher in-training exam scores. Residency training programs should implement programs to decrease burnout, increase work engagement, and increase quality of life in order to improve academic performance.



In-Training Exam Scores vs Burnout, Work Engagement, and Quality of Life





Got Stress? Investigating Burnout Among Emergency Medicine Interns

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Background:

Emergency medicine (EM) residents are exposed to many stressors beginning their first year of training. Understanding levels of burnout among EM interns has short-term and long-term implications in their physical and psychological well-being, personal learning, quality of patient care, and career satisfaction.

Objective:

To investigate the prevalence and trends of burnout among 13 EM interns across the first six months of their intern year.

Design/Methods:

In this prospective study, 13 EM interns of Presence Resurrection Medical Center's EM Residency Program anonymously completed the Maslach Burnout Inventory (MBI) at 3 time intervals: July 2015, October 2015, and January 2016. The MBI assesses the 3 proposed dimensions of burnout: emotional exhaustion (EE), depersonalization (DP), and personal achievement (PA). Means of the interns' sub-scores to these 3 sections were calculated, and the differences in the sub-scores across time were compared by Student's t-tests.

Results:

From July 2015 to October 2015, EE means stayed "low" ($p=0.4936$) and PA means stayed at "moderate" ($p=0.4936$), but DP means increased from the "moderate" to "high" level of burnout ($p=0.4432$). From October 2015 to January 2016, EE means continued to stay "low" ($p=0.5802$) and DP means continued to stay "high," but PA means decreased from "moderate" to "low" ($p=0.3193$).

Conclusions:

While trends were seen, there were no statistically significant differences in burnout levels throughout the first six months of intern year. It is proposed that the increasing responsibilities and expectations of interns were balanced with increasing comfort with their role and skills. In addition, the push for better productivity in number of patients seen per hour may have led to feelings of insensitivity or cynicism towards patients. However, there was still a positive sense of self-worth and accomplishment with their daily work. Despite the rigors of EM intern year, with early incorporation of a wellness curriculum, residents can learn to be empathic yet competent and efficient providers, and also avoid burnout.

Impact:

This is a preliminary pilot study that has demonstrated the feasibility of using the MBI to measure residents' burnout levels during the course of their residency. Future studies should be larger and multi-centered with $n=158$ to achieve appropriate power



Skin and Soft Tissue Infections in the Emergency Department and Immediate Care Setting - An Examination of Local Antibigram

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Background:

There were an estimated 6.8 million Emergency Department (ED) visits for skin and soft tissue infection (SSTIs) in 2014¹. This nearly three-fold increase in visits is attributed to the rise in community associated MRSA (Ca-MRSA), which is now the most common cause of purulent skin infections in EDs¹. In 2014, a panel of experts at the Infectious Diseases Society of America (IDSA) updated the recommendations for the treatment of SSTI for the first time since 2005². The guidelines emphasize the importance of prompt diagnosis and pathogen directed antibiotic treatment when indicated by more severe purulent skin infections (abscesses). As with all IDSA guidelines, the panel identified consideration of local antibiograms and skin-specific sensitivities as paramount in the treatment of SSTI in the ED.

Objectives:

To examine and compare the causative bacteria and local antimicrobial susceptibility rates in isolates obtained from skin abscesses in the ED and Immediate Care (IMC) settings and consider implications for site specific antibiotic selection. It is hypothesized that patterns closely mirror the 75-80% MRSA rate identified in national literature¹.

Methods:

A retrospective query was performed to obtain susceptibility patterns in skin (abscess) isolates from all-comers at a Level 1 urban ED and 3 satellites IMC sites during the 2015 calendar year. Skin-specific cultures were obtained by identifying accompanying ICD-10 codes for abscess. Prevalence of causative bacteria and antibiotic resistance rates were then calculated and compared to IDSA recommendations. Cultures were deemed clinically significant if "moderate" or "many" colonies were grown.

Results:

Sixty four ED samples and 36 IMC samples were obtained from skin sources during the calendar year. Of the ED samples, 1 grew lactobacillus, 2 grew Ecoli, 10 grew streptococcus, and 25 grew staphylococcus. Of the IMC samples, 0 grew streptococcus, 1 grew actinomyces, and 21 grew staphylococcus. Fifty eight percent of IMC staphylococcus species were MRSA vs 48% in the ED setting. One hundred percent of MRSA was susceptible to Doxycycline and TMP-SMX, while 68% were resistant to Clindamycin.

Conclusions:

As suspected, Staphylococcus was the most common cause of purulent skin infections in local ED and IMC patients. The rate of MRSA in our ED population was 51%, far less than the 75-80% reported in other EDs.



The newest IDSA guidelines recommend stratifying purulent skin infections as “mild” “moderate” or “severe” based on the presence or absence of systemic symptoms. In patients with mild abscesses, empiric treatment with TMP-SMX and Doxycycline is recommended. Clindamycin is no longer recommended due to increased resistance in skin cultures. Our local sensitivities support these recommendations. While it is important for providers to be aware of national treatment guidelines, knowledge of local sensitivities continues to be necessary in treatment decisions.

References:

1. Mistry, et al. *WJEM*, Volume XV (4), 491
2. Stevens et al. *IDSA Practice Guidelines for SSTI*, 2014
3. Pallin et al. *Annals of Emergency Medicine*, Volume 51 (3) 291



Pediatric Interfacility Transfer in Illinois

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Background/Objective:

In Illinois there are 110 hospitals that currently participate in Facility Recognition by the Emergency Medical Services for Children (EMSC) program. The breakdown of facilities is PCCC/EDAP level = 10; EDAP level = 87; SEDP level = 13. In 2014, there were approximately 960,000 ED visits for ages 0-15 y/o with 79.6% of these visits in a PCCC, EDAP or SEDP. There were approximately 29,000 pediatric admissions with 94.8% of these admissions taking place in a PCCC, EDAP, or SEDP facility (Source: Illinois Hospital Assn Compdata). However, many of those admissions are from the presenting hospital to a higher level of care. The Facility Recognition and Quality Committee of Illinois EMSC sought to identify barriers to transfer and the current state of feedback on pediatric transfer patients.

Methods:

A survey was taken of 187 hospital emergency departments in the state. Surveys were mailed and the cover letter included a web site to complete the survey on line. Respondents could alternatively complete the paper survey and return it in a self addressed stamped envelope. 160 surveys were returned (85.5%)

Results:

Overall, 105 (67.7%) responded that they can call a transfer center to help arrange a pediatric transfer. However, half of those respondents replied that it still takes more than 2 calls to arrange the transfer. For medical transfers 75 (52.4%), for surgical transfers 78 (55.4%), for burns 63 (45%) and for trauma it was 50 (35.9%) that replied it still took multiple calls.

For Standby Emergency Departments Approved for Pediatrics (SEDP) facilities, which are typically rural or Critical Access Hospitals, the results were higher: Medical 8(57.1%) Surgical 9(64.2%) Burns 6(42.8%) and Trauma 7(49.9%).

Only half of the respondents replied that they receive any feedback, and most replied that it was very facility specific. 75(46.8%) get a final diagnosis, 76 (47.5%) receive a discharge date, and 52 (32.5%) get information about operative intervention. Only 30 (18.8%) responded that they are notified if child maltreatment was found or DCFS was involved. Conversely, in addition to the above parameters 69(43%) would like to know if the child was intubated, 60(37.5%) want to know about antibiotics and 66(41.2%) want to know about fluid resuscitation. 142(88.8%) responded that they wanted to receive feedback, 82(58.2%) at time of discharge of the patient, 39(27.7%) at 24 hours after transfer and 3(2.1%) would like feedback at 12 hours after transfer. 116(82.3) preferred feedback in a letter or discharge summary, 17(12.1%) preferred a fax and surprisingly only 8(5.7%) requested a phone call. Many respondents commented that it takes too long to get letters, but only 75(53.1%) responded that they had a pre-determined person at their institution to receive feedback on pediatric transfers.

Conclusions:

Pediatric patients often require transfer to a higher level of care. Facilities still must place multiple phone calls to arrange these transfers, and some of those facilities are standby departments with limited staff and resources. Feedback to referring hospitals on transferred pediatric patients has ramifications for quality improvement and care continuation but it is often inconsistent and facility specific. Efforts should be taken to streamline and facilitate the transfer process, and to give follow-up information in a timely and consistent manner.



The Impact of Hemodialysis on Survival In Intubated Salicylate-poisoned patients

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Background:

Severe salicylate toxicity is associated with high mortality if mechanical ventilation is required due to the reliance of hyperventilation to keep acid-base homeostasis. Timely hemodialysis may be a life-saving therapy in these cases.

Objective:

Patients with severe salicylate toxicity requiring intubation have an increased mortality without prompt hemodialysis. In this study, we evaluate the impact of hemodialysis on survival rates in severely poisoned intubated patients.

Design/Methods:

This is a retrospective observational study. All salicylate cases reported to the Illinois Poison Center were reviewed from 2003-2014. Intubated patients with a salicylate level greater than 50mg/dL were included for analysis. Charts were reviewed for data including age, sex, initial and peak aspirin levels, arterial blood gas results, ventilator settings, and if the patient received activated charcoal, urinary alkalinization, and/or hemodialysis. Particular attention was paid to implementation of dialysis.

Results:

56 cases were identified with an overall survival rate of 73.2% (41/56). 26.7% of deaths (4/15) received hemodialysis before time of peri-arrest. The measured initial serum aspirin level was compared to patient survival. When patients received hemodialysis, an initial aspirin level greater than 50mg/dL had a 88.5% survival rate and 90% survival when the level was greater than 90mg/dL (Figure 1). The measured peak serum aspirin level was compared to patient survival. When patients received hemodialysis, a peak aspirin level greater than 50mg/dL had a 83.9% survival rate and 76.9% survival when the level was greater than 90mg/dL. The rate of survival drastically reduced without the implementation of hemodialysis (Figure 1).

Conclusion:

Expelling carbon dioxide is an essential mechanism to alkalinize the blood and becomes even more apparent when sodium bicarbonate is required for urine alkalinization. Intubated aspirin patients may do more poorly as it is difficult to provide the high minute ventilations necessary to maintain hyperventilation, hemodialysis should be considered early to decrease the salicylate level and improve chances of survival.

Impact:

In the salicylate toxic patient who requires mechanical ventilation, emergent hemodialysis should be initiated as soon as possible to decrease mortality.



Flipping the Fourth Year Clerkship: Asynchronous Learning Applied in the Simulation Lab with Residents as Teachers

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Background:

Advances in technology and educational resources have changed the way learners access information. In the past a student would be introduced to topics in a classroom, read material in a text-book, complete assignments as homework and have an assessment in the classroom. Given the high quality online material available, as well as the rise of simulation as a teaching method, we developed a curriculum that allows students to learn topics asynchronously at their own pace and then reinforce these topics in hands on fashion that is both safe and enjoyable.

Objective:

The goal of our innovation was to provide quality Emergency Medicine (EM) content to our fourth year clerkship students by incorporating pre-selected high quality online multimedia resources with hands on simulation to reinforce and assess critical concepts in a high fidelity environment. Our hope was to achieve more practical and effective learning of common presentations in the Emergency Department.

Design/Methods:

The EM content was delivered asynchronously through a clerkship website. The material available to the students included videos from the clerkship director as well as from Flipped EM Classroom. Online learning modules were developed to help guide the students through common presentations such as chest pain, dyspnea and altered mental status.

The clerkship students assembled in the simulation lab weekly to apply what they had learned asynchronously. Each session's cases were based on the chief complaint presentation reviewed asynchronously. EM residents administered the simulation while the clerkship director served as a nurse confederate. Procedural skills such as intubation were performed during the simulation and reinforced in detail after the simulation had completed. The EM residents and faculty performed debriefing.

Impact:

Students found the asynchronous learning efficient and enjoyable and provided very positive feedback regarding the simulation sessions. Residents gained experience in "bedside" teaching as well as simulation operation and received real time feedback on their teaching skills by faculty. Future areas of interest will include objectively assessing the appeal and effectiveness of the asynchronous learning modules, simulation labs, and residents as teachers (RATS) experience.



Impact of Front-End Process Improvement on Emergency Department Metrics

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Objective:

Evaluate impact of front end LEAN process changes on ED throughput metrics.

Design/Methods:

We analyzed throughput metrics of arrivals, left without being seen (LWBS), arrival to provider (medical screening exam, MSE), arrival to discharge and admit decision to admit from March 2015 – August 2015. We formed a process improvement team of frontline staff, surveyed staff, and conducted process observations. We organized items into a control-impact analysis, then prioritized based on an effort-impact chart for implementation. On September 1st, 2015 we implemented our new processes (direct bedding, rapid triage/registration, flow nurse, staff alignment) and prospectively analyzed data. Using linear regression we identified the independent factors that impact our throughput.

Results:

We compared pre and post process improvement (table 1) ED metrics.

Table 1. Pre- and Post-Implementation ED Throughput Metrics

	Pre-Implementation	Post-Implementation
Volume	198	191
LWBS (%)	6.2	5.4
Arrival to MSE	71.3	60.2
Arrival to Discharge	233.0	225.5
Admit Decision to Admit	140.6	152.2

We identified that increases in ED boarding time was a significant driver of the other throughput metrics. When ED boarding time was <150 minutes, arrival to MSE, arrival to discharge, and LWBS were 43 minutes, 204 minutes and 1.9% respectively. When ED boarding was 150-175 minutes, arrival to MSE, arrival to discharge and LWBS were 73 minutes, 220 minutes and 7.4% respectively. When ED boarding times were >175 minutes, arrival to MSE, arrival to discharge, and LWBS were 90 minutes, 262 minutes and 10.9%.

To evaluate the efficacy of our front-end process changes we compared above metrics from the month prior and post implementation. We controlled for boarding times by comparing days on which our admit decision to admit was less than 150 minutes. We found significant decreases in all metrics including a 47.3% decrease in door to MSE, 15% reduction in door to discharge and a 62.8% reduction in LWBS.

Conclusion:

Front-end LEAN methodologies improved ED throughput metrics. These impacts were most marked on days with ED boarding <150 minutes. Through use of linear regression the factors most strongly correlated with increases in arrival to discharge were: arrival volume and time from decision to admit to admit.

Impact:

Implementation of LEAN methodologies on front-end processes significantly improves ED throughput metrics.



Improving Patient Satisfaction in the Emergency Department Using a Patient Callback Program

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Background: Patient satisfaction has become an important parameter tracked in US healthcare systems. Telephone calls to recently discharged emergency department (ED) patients have been associated with improved patient satisfaction.

Objective: To gain insight into patients' perceptions of their experience in the ED through the use of patient callbacks soon after discharge.

Design/Methods: Over one year, a convenience sample of pediatric and adult patients from one university and three community teaching hospitals with a combined census of over 200,000 were surveyed by telephone within one month of their ED visit. Data recorded included: diagnostic category (gastrointestinal/cardiac, musculoskeletal/trauma and infectious), insurance status (commercial, Medicaid/Medicare and unfunded) and answers to "What went well?" and "What needs to improve?".

Results: A total of 222 patients were surveyed. (Table) When asked "What went well?", patients with infectious complaints were more likely to report the explanation of their condition and the care they received from the ED staff than those with musculoskeletal/trauma complaints. Conversely, patients with musculoskeletal/trauma complaints were more likely to report improvement of their symptoms as compared with those patients with infectious complaints. ($p = 0.03$) Patients with commercial insurance were more likely to report "Nothing" needed to improve concerning their ED visit as compared with Medicaid/Medicare and unfunded patients. ($p = 0.04$) Commercially insured patients were also less likely to complain of the wait time to be seen or treated as compared with Medicaid/Medicare and unfunded patients. ($p = 0.01$)

Conclusion: The majority of patients felt positively about the care they received in the ED. The majority of patients felt the timeliness of their care needed to improve. Commercially insured patients were less likely to feel something needed to improve during their ED experience and were less likely to complain about wait times.

Impact: Efforts to improve ED patient satisfaction should focus primarily on reducing patient wait times to evaluation and treatment. Further efforts to encourage ED staff to explain and educate patients about their conditions and to convey a caring environment will likely improve patient satisfaction.

Table

Patient Characteristics and Responses

Age		Insurance status		Diagnostic category	
0-18 years	18%	Commercial	54%	Gastrointestinal/Cardiac	25%
Over 18 years	82%	Medicaid/Medicare	36%	Musculoskeletal/Trauma	32%
		Unfunded	10%	Infectious	43%
"What went well?"			"What needs to improve?"		
Explanation of condition and care received from ED staff			Wait to be seen/treated	68%	
Symptoms improved			Explanation of condition and care received from ED staff	32%	



Do Uninsured Patients in Illinois Have Higher Mortality After Trauma?

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Background:

Being uninsured is associated with higher mortality after trauma. With the implementation of the Affordable Care Act, ACA, in Illinois there has been an approximately 25% decrease in proportion of patients who are uninsured.

Objective:

The objective of this study is to evaluate whether insurance-related mortality disparities have continued through the period of ACA insurance expansion in Illinois.

Design/Methods:

We obtained hospitalization claims data from all non-federal hospitals in Illinois from mid-2010 through first-quarter 2015. Cases were identified as those with trauma-related ICD-9 codes and an E-CODE pertaining major mechanisms of trauma (cut/pierce, fall, gunshot wound, motor vehicle collision, or other blunt injury). We employed Poisson regression adjusted for clustering within hospitals and controlling for age, sex, race, zip code household median income, mechanism of injury, shock, extent of anatomic injury, comorbidities, hospital ED volume, and year of admission.

Results:

A total of 87,537 patients met trauma inclusion criteria. Uninsured patients dropped from approximately 20% to 8% over the study period. Crude mortality increased among uninsured patients over this time period as well (Figure 1). The adjusted incidence rate ratio after trauma was higher 1.19 (95%CI 1.02 to 1.39), among uninsured patients when compared with privately insured patients.

Conclusion:

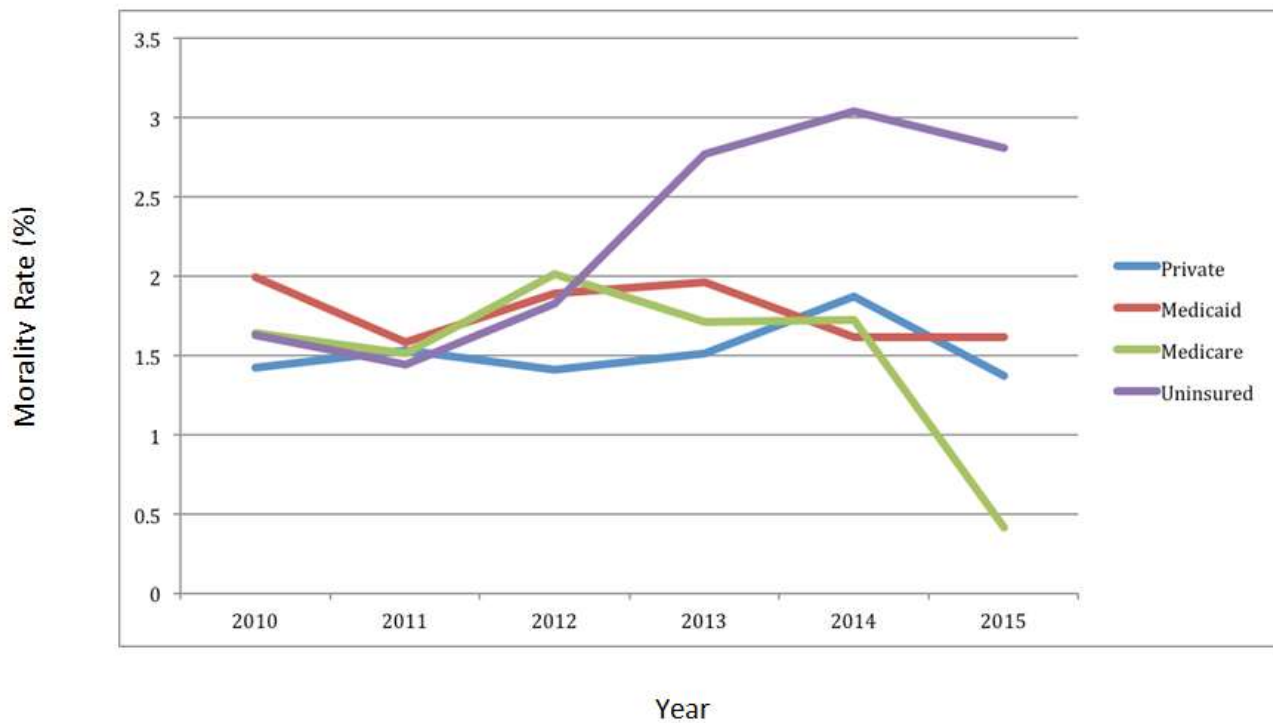
Uninsured patients continue to suffer a higher burden of mortality after the implementation of the ACA. While there is an overall reduction in number of uninsured trauma patients, uninsured patients continued to fare worse after trauma and the mortality rate within this patient population appears to be increasing. This elevated burden of mortality may reflect patient factors, hospital or provider factors, or as yet unmeasured confounders.

Impact:

Uninsured patients continue to suffer higher mortality rates after trauma in Illinois despite ACA-associated increases in insurance coverage.



Figure 1. Mortality rates by insurance states during the period of Affordable Care Act insurance expansion





Impact of Twitter Promotion by a Social Media Team on Article and Medical Journal Website Traffic

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Background:

Social media (SM) is increasingly utilized by health professionals to share user-generated information online. Scientific journals are employing SM to disseminate information regarding new publications to create real-time interactivity to increase readership. Studies evaluating the impact of SM on readership of the peer-reviewed literature have had conflicting results.

Objective:

Annals of Emergency Medicine's SM strategy began in 2008, which included a monthly podcast and article promotion on Facebook and Twitter. This strategy was expanded in the latter half of 2013 to include a social media team composed of active members of the online emergency medicine community which shared Annals articles in press (AIP) from their personal Twitter accounts.

Design/Methods:

An observational study was conducted to assess the impact of Twitter promotion by a SMT on readership of AIP and the Annals' website. Summary statistics (mean \pm SD) were calculated for overall pageviews per AIP, pageviews from Twitter per AIP, and the website's pageviews per month before and after the intervention, and compared using unpaired two-tailed t-tests with unequal variance.

Results:

Following the intervention AIP pageviews (mean \pm SD) increased from 9,027 \pm 2,777 to 9,806 \pm 3,486 ($p=0.54$), AIP pageviews from Twitter increased from 622 \pm 390 to 1,823 \pm 532 ($p<0.001$), and total pageviews per month of the Annals website increased from 125,564 \pm 29,213 to 136,016 \pm 12,571 ($p=0.2$).

Conclusion:

The addition of Twitter promotion by a social media team to a social media strategy that also used Facebook posts, podcasts, and blog posts was associated with a statistically significant increase in pageviews per AIP from Twitter. However, there was not a significant increase in overall AIP or website pageviews. These findings suggest that a coordinated promotion strategy on Twitter is effective for increasing click-through but did not make a substantive impact on overall readership.

Impact:

Annals of Emergency Medicine has attempted to develop a comprehensive social media strategy which uses tweets, Facebook posts, podcasts, and blogs to share medical information and attract readers. This study examines the changes in information dissemination and readership that occurred following the introduction of these efforts.



D-dimer versus Obesity in the Emergency Department Setting

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Background:

The D-dimer is a commonly used laboratory test used in the Emergency Department to aid in the diagnosis and exclusion of pulmonary embolism (PE). However, there has been no study performed with emergency department patients evaluating a correlation between obesity and the D-dimer. It is known that elevated D-dimer does not always translate to pulmonary emboli and the false positive rate is high. This study serves to study the potential correlation of obesity and elevated D-dimer, which could aid the emergency department physician in evaluating the obese patient with potential pulmonary embolism.

Objective:

To evaluate for a correlation between a positive D-dimer and BMI in emergency department patients in the Emergency Department.

Design/Methods:

A retrospective study evaluating patients in the emergency department that were low-risk for pulmonary embolism. Utilizing the electronic medical records, D-dimer and BMI values were obtained to assess for any change in the false positive rate in patients with and without obesity.

Results:

D-dimer values and BMIs were obtained for approximately 132 patients recorded from 2014-2015, none of whom had PE. The mean age was 42.0 (SD: 15.9) with 67.4% females (89/132). The mean BMI was 28.7 (SD: 7.3). 46 (34.8%) were normal weight (BMI <25), 43 (32.6%) were overweight (25 ≤ BMI <30), and 43 (32.6%) were obese (BMI ≥30). D-dimer was falsely positive in 22.0%. False positive rate was 21.7% in normal patients, 20.9% in overweight patients, and 23.3% in obese patients (p=0.966). The adjusted odds ratio of BMI for false elevation of D-dimer was 1.03 (95% CI: .967, 1.10; p=.352).

Conclusion:

In this study, there is no significant correlation between false positive D-dimer and obesity.

Impact:

In evaluating the obese patient that is low-risk for pulmonary embolism, D-dimer can be used with no expectation of increased number of false positive results.



Impact of Electronic Medical Record System on CT Scan Use in Recurrent Abdominal Pain Patients

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Background:

Abdominal pain is the most common presenting complaint in the emergency department (ED) in the United States and computed tomography (CT) is commonly part of the diagnostic evaluation. The utility of an electronic medical record (EMR) system is extremely useful in this setting because a similar presentation with a prior negative CT may help the ED physician avoid a repeat CT.

Objective:

To determine the effects of an EMR implementation on the rates of repeat CT abdomen and pelvis in the ED for patients presenting with undifferentiated abdominal pain.

Design/Methods:

Retrospective cohort study which analyzed the numbers of CT scans of the abdomen and pelvis for patients presenting with undifferentiated abdominal pain. The study evaluated a 9 month period before and 9 month period after the implementation of an EMR system at a single community ED. Patients with repeat visits within 6 months of their initial visit were included in the evaluation. The utilization of contrast was also analyzed in this study.

Results:

Prior to implementation of the EMR, there was a repeat rate of 33.3% compared with a 39.6% during the post implementation period. Statistical analysis using a two-sample, two-tailed chi-square test for differences of proportions was associated with a p value of 0.290. Secondary analysis evaluating contrast administration showed the period prior to the EMR implementation had a higher percentage of contrast administration changes on repeat CT scans.

Conclusion:

There was no statistically significant difference in the rate of repeat CT scans of the abdomen and pelvis. We conclude that the implementation of an EMR may not be associated with a decrease in utilization of repeat CT imaging for patients with undifferentiated abdominal pain.

Impact:

ED administrators and staff should not necessarily expect a decrease in CT utilization solely from the implementation of an EMR system.



Impact of a Patient Education Intervention on Urinalysis Contamination Rates in Female Patients in the Emergency Department

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Background: Evaluation for urinary tract infections (UTIs) in female Emergency Department (ED) patients is common. Most of these samples are ideally provided as a “clean catch” to minimize the risk of contamination by vaginal flora. However, instructions by ED staff on the proper technique to provide this “clean catch” urine sample is typically not standardized. Improperly collected/contaminated urine can result in the inappropriate use of antibiotics.

Objective: We sought to determine if the use of a standardized diagram handed to patients before collection of their urine specimen would decrease the frequency of contaminated urine specimens.

Design/Methods: The study compared a retrospective sampling of urine specimens collected in a single ED following verbal instructions from nursing staff based upon their routine practice vs. a prospective use of verbal instructions along with handing the patient a simple diagram of proper urine collection technique. We then compared the samples with regards to squamous epithelial cells, white blood cell (wbc) count, bacteria and if a culture was sent, the contamination rate.

Results:

	Retrospective (Standard patient instructions) N=248	Prospective (Instruction diagram given to patient) N=165	P Value
Squamous Epi			
0-5	151 (60.9%)	126 (76.4%)	0.001
6 or more	97 (39.1%)	39 (23.6%)	
WBC			
0-5	14 (6%)	9 (7.3%)	0.93
6 or more	234 (94%)	156 (92.7%)	
Bacteria			
None/few	175 (70.6%)	128 (77.5%)	0.31
Moderate/Lg.	73 (29.4%)	37 (22.5%)	

In the retrospective standard patient instruction group a urine culture was sent because of an abnormal microscopic examination in 53 patients. Twenty-six (49.1%) were contaminated. In the prospective group of patients 54 cultures were sent and 32 (59.3%) were contaminated ($p=0.29$).

Conclusion:

Providing ED patients with a diagram of instructions on proper urine collection technique in addition to standard verbal instructions significantly decreased the number of squamous cells in their urinalysis examinations, but did not significantly reduce the number of wbcs, bacteria or urine culture rates of contamination.

Impact: Additional studies in the ED setting are needed to determine if other methods of patient education on how to properly provide a urine specimen from female patients will reduce the likelihood of contamination and inappropriate antibiotic use.



Creation, Implementation, and Assessment of a Near-Peer Taught, EM-Focused Electrocardiogram Curriculum for EM PGY1s

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Background:

Electrocardiogram (ECG) interpretation is fundamental to the practice of emergency medicine (EM). Expert training needs to be provided during EM residency because only the basics can be assumed to be covered in medical school. Currently there is no nationally recognized or endorsed ECG curriculum for EM residents. We describe the implementation of an innovative near-peer standardized curriculum for first year residents in ECG interpretation.

Objective:

Our primary objective was to develop a curriculum encompassing ECG diagnoses critical to the practice of EM, minimize the effect of varied medical school exposure, and provide enrichment via exposure to rare ECGs.

Design/Methods:

Material from a cardiology elective as well as free open access medical education (FOAMed) resources were used to create 34 EM-focused cases which have been taught by near-peer (PGY-3/4) volunteers during established weekly PGY-1 educational sessions since July 2014. Cases with an ECG, FOAMed links, and challenge questions were emailed to PGY-1s in advance of a short (10-15 minute) small group. After each session an answer document is sent for further review and future use as a resource. This curriculum could easily be expanded to additional residency programs and since July 2015 is also being implemented at another program by a recent graduate.

Results:

The Northwestern EM classes of 2018 & 2019 were surveyed on their medical school ECG education and the effectiveness of this innovation. 22 of 30 surveys were completed and 1 was partially completed. Participants believed that medical school prepared them to interpret ECGs in the ED either very poorly or poorly in 13/23 (57%) of responses. Participants believed that instruction while working in the ED was ineffective or very ineffective in 17/22 (77%) of responses and split between 7/11 (64%) PGY1s and 10/11 (91%) of PGY2s. Participants believed that instruction provided via this innovation was effective or very effective in 22/22 (100%) of responses. Participants believed near-peers (PGY2-4) are the most effective teachers in 16/22 (73%) of responses, split between 10/11 (91%) PGY1s and 6/11 (55%) of PGY2s, with EM attending at 4/22 (18%) and EM fellow 2/22 (9%) as the remaining responses. Overall, comparing the frequency of effective/very effective responses for on-shift instruction with near-peer instruction we found a significant difference (5/22 vs 22/22, $p < 0.001$). Also, comparing the frequency of effective/very effective responses for on-shift instruction between the PGY1 and PGY2 class we found a non-significant difference (7/11 vs 10/11, $p = 0.31$). Also, comparing the frequency of effective/very effective responses for near-peer instruction between the PGY1 and PGY2 class we found a non-significant difference (10/11 vs 6/11, $p = 0.31$).

Conclusion/Impact:

This curriculum could easily be expanded to additional residency programs and since July 2015 is also being implemented at another program by a recent graduate. In summary, the effectiveness of this curriculum is perceived significantly more favorably than bedside instruction at this institution.



Emergency Medicine Trainees with High Emotional Exhaustion are Associated with Lower Patient Satisfaction Scores

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Background:

Burnout is a syndrome of emotional exhaustion, depersonalization and sense of low personal accomplishment. Emergency medicine (EM) physicians experience the highest levels of burnout among all specialties. Physician burnout is associated with lower quality of patient care. It is unknown if EM trainee burnout is also associated with poorer quality of care.

Objective:

We examined the relationship between EM trainee burnout and resident-specific Press Ganey patient satisfaction (PS) scores. We hypothesized that burnout would be associated with lower PS scores.

Design/Methods:

In this cross-sectional survey study conducted in October 2015 we assessed burnout in all post-graduate year 1-4 EM trainees at a single academic program using the Maslach Burnout Inventory. Resident-specific PS measures included: (1) likelihood to recommend; (2) courtesy; (3) taking the time to listen; (4) keeping the patient informed; and (5) concern for patient comfort. In our primary analysis overall burnout was dichotomized by high depersonalization or emotional exhaustion subscale scores and compared to PS scores using an independent samples t-test. In our secondary analyses each burnout subscale was treated as a continuous variable and compared to PS scores via linear regression.

Results:

Thirty-six out of 54 (66.7%) eligible trainees responded to the survey and 27 (75.0%) reported burnout. Excluding trainees lacking PS data, mean PS scores for the remaining 20 participants were: (1) 66.8 (SD ± 11.3); (2) 70.8 (± 11.3); (3) 67.6 (± 11.8); (4) 62.7 (± 12.0); and (5) 66.2 (± 11.5). In our primary analysis there were no significant associations between overall burnout and PS scores. In our secondary analyses, however, high emotional exhaustion scores were negatively associated with all PS scores: (1) 95% CI (-0.86, -0.08), $p=0.02$; (2) CI (-0.88, -0.10), $p=0.02$; (3) CI (-0.88, -0.04), $p=0.03$; (4) CI (-0.92, -0.08), $p=0.02$; and (5) CI (-0.85, -0.02), $p=0.04$. There were no significant associations between the depersonalization and personal accomplishment subscales with PS scores.

Conclusion:

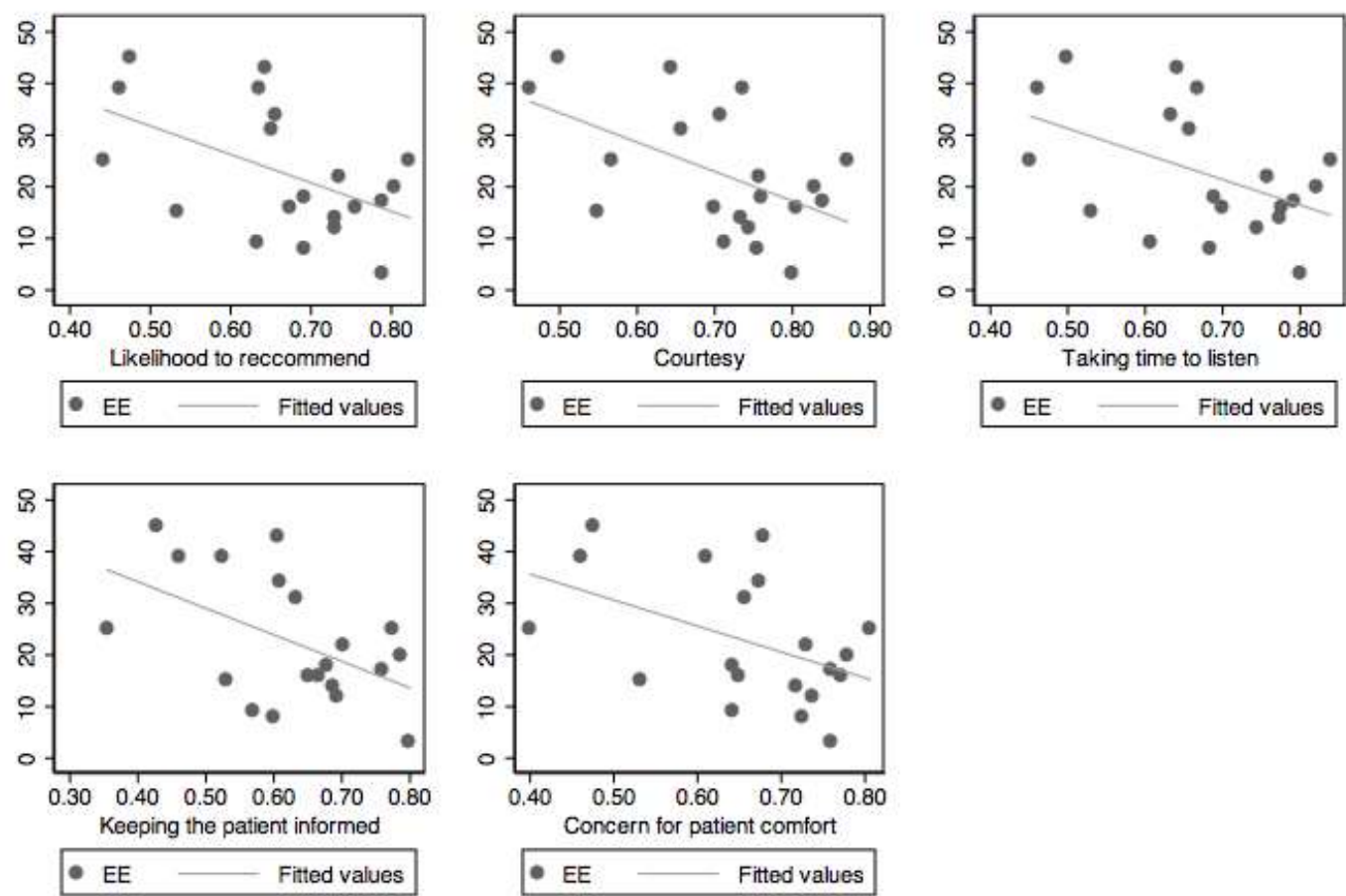
EM trainees' emotional exhaustion scores were negatively associated with all PS scores. We did not find associations between overall burnout with PS scores, but these results may have been limited by the study's small sample size.



Impact:

High emotional exhaustion scores among EM trainees are associated with lower Press Ganey patient satisfaction scores. Residency training programs should implement programs to decrease burnout and improve emotional exhaustion in order to improve patient satisfaction.

Figure 1. Emotional Exhaustion (EE) vs Press-Ganey Patient Satisfaction





Pulmonary Embolism (PE) Point Prevalence Rates in Suspected PE Patients from 164 Clinical Studies Are Low Enough To Allow For More Frequent Preliminary D-dimer Use

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Background:

The diagnosis of pulmonary embolism (PE) in Emergency Department (ED) patients is a clinical priority, often necessitating the use of advanced diagnostics such as CT angiography (CTA). Attempts to safely reduce chest CTA use depends, in part, on the presumed prevalence of PE in the at-risk patient population being evaluated. Although D-dimer use might be able to reduce CTA use, this preliminary test can be more broadly used if the PE point prevalence is sufficiently low in the clinical setting.

Objective:

To determine the point prevalence of PE in the overall and high-risk patient populations (based on history, symptoms, signs, and laboratory testing) from ED-based and studies from other clinical settings.

Methods:

A Medline search used relevant search terms to identify clinical trials of patients suspected of having PE. High-risk populations were identified by clinical judgment, symptoms, signs, PERC rule, Wells criteria, D-dimer, and VQ testing.

Results:

Using data from all 164 published clinical studies, the average patient PE point prevalence was 18%. In the 80 ED based studies, the prevalence was 13%. The PE prevalence rate in patients defined to be high-risk patients based on clinical scales was 16%. In patients groups defined to be high risk based on clinical judgment, symptoms, or physical signs, the PE point prevalence rate was 22%. The PE point prevalence rates in high-risk patients as defined by a positive D-dimer or VQ scan were 15% and 30%, respectively. In high-risk patients identified in ED studies, the PE point prevalence was 38%.

Conclusions:

All of the patient PE point prevalence rates in populations from published clinical studies are lower than the 40% "high risk patient" cutoff at which D-dimer use is not recommended prior to CTA use. Without the presence of specific clinical judgment criteria, signs, symptoms, or tests that indicated suspected PE patients are at high-risk, it should be possible to more often utilize D-dimer testing to exclude PE. This might then reduce the number of negative CTAs performed, leading to enhanced patient safety, improved patient outcomes, and optimized resource utilization, both within and outside of the ED.



Pulmonary Embolism Positive Point Prevalence in 32 Clinical Studies that Utilize Chest CTA in the Detection of Pulmonary Embolism in At Risk Patients

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Background:

The pulmonary embolism (PE) point prevalence in patients considered to be "at risk" for PE may be sufficiently low to allow for a safe reduction in chest CT Angiography (CTA) use. A benchmark for the rate at which chest CTA is positive for PE in clinical practice and in particular, in the Emergency Department (ED), remains unidentified.

Objective:

To determine the PE point prevalence rates in studies that utilize CTA in the diagnostic process, including both studies that established CTA test characteristics and clinical studies that used CTA to diagnose PE.

Methods:

Studies that identified the use of CTA in the diagnosis of PE in at risk patients were included in this analysis. Included in the analysis were overall populations and those patients with clinical criteria that suggested high risk for PE.

Results:

Of 164 possible PE studies examined, 32 (20%) specifically reported the outcomes of CTA use for the diagnosis of PE among 26,989 at risk patients. The overall PE point prevalence positive rate in these 32 CTA use studies was $17.6 \pm 14.9\%$. ED studies with CTA use reported a lower CTA positive rate (10.1%) than studies from other clinical settings (27.1%) ($p < .05$). Studies that examined PE point prevalence in at risk patients had a lower CTA positive rate than those studies that primarily established CTA test characteristics (15.0 vs. 21.7%).

Conclusions:

The overall 17.6% point prevalence rates for PE in studies that examined CTA utilization were similar to the 18% PE positive point prevalence rate observed in all 164 PE patient diagnostic studies reviewed. In the ED, CTA testing was positive in 10% of patients. This low CTA positive rate suggests that CTA may be over-utilized, especially if this diagnostic test is not preceded by a positive D-dimer in patients who do not have clinical criteria that strongly suggest high PE risk. This 10% ED patient positive CTA rate for PE can serve as a benchmark for comparison as emergency physicians strive to improve quality and patient safety through optimizing the use of CTA in at risk ED patients.



Analgesic Use in Six Urban Emergency Departments: Pain Management for Patients with Biliary Colic, Bowel Obstruction, Extremity Fractures, Migraine Headache, and Renal Colic

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Background:

Inadequate treatment of pain in the emergency department (ED) is an important ongoing patient care issue.

Objective:

The objective of this study was to analyze analgesic use for ED patients with presumed biliary colic, bowel obstruction, extremity fractures (upper and lower), migraine headache, and renal colic.

Methods:

A retrospective review of 1,652 patient charts from six urban university-affiliated EDs was completed.

Results:

In the 1,652 patients, the mean age of 49 ± 20 years, and 24% were 65 or older. Females were 61% of the patients, 76% were ambulatory, and 66% were discharged home from the ED. In the 44% of cases with ethnicity reported, 42% were Caucasian, 41% African-American, and 16% Hispanic. By design, approximately 17% of the patients in this series had each of the six ED discharge diagnoses. Among all patients, 78% were administered a medication while in the ED, with 1.5x more patients receiving an analgesic as compared to a non-analgesic medication. For the 61% of those patients who received an analgesic, 2.2x more patients received narcotic analgesics (69%) as compared to non-narcotic analgesics (31%) ($p < .05$). Among patients receiving an analgesic, 47% received their first analgesic within 60 minutes of triage, while 24% received their first analgesic after 120 minutes in the ED. The mean time to first analgesic was 109 ± 158 min. Renal colic and extremity (lower and upper) fracture patients were more likely to receive their first analgesic medication within 60 minutes as compared to those with the diagnoses of biliary colic, bowel obstruction, and migraine headache ($p < 0.008$). Biliary colic and bowel obstruction patients were more likely to receive their first medication after 120 minutes than were patients with the other four diagnoses ($p < 0.001$). There was no significant difference in time to first analgesic based on gender or patient-reported pain severity. Patients who entered the ED at night (0:00-7:59) had a 1.39x and 2.00x greater odds of receiving their first analgesic within 60 min (57%) as compared to patients entering the ED during the day (48%, $p < .05$) and evening (39%, $p < .001$). Caucasian patients had a 2.50 and 2.22x greater odds of receiving their first analgesic within one hour as compared to African American and Hispanic patients, respectively ($p < 0.004$), and African American patients had a 2.68 and 1.97x greater odds of not receiving their first analgesic until after two hours as compared to Caucasian and Hispanic patients, respectively ($p < 0.04$).

Conclusions:

ED pain management predominantly utilized narcotics. Gender and patient-rated pain had no effect on medication dosing or timing. Patients entering the ED at night and those with the diagnosis of renal colic or extremity fracture had increased odds of receiving analgesics at an earlier time. The analysis of the limited ethnicity data suggests that there was a difference in time to analgesic therapy based on ethnicity, requiring further analysis.



An Initial Patient Experience Profile in the Emergency Department: Interaction and Communication Among Physicians and Patients

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Background:

Patient experience is an important metric of healthcare delivery. A positive encounter helps with patient retention, likelihood to recommend and is required by Centers for Medicare and Medicaid Services. Literature reporting effectiveness of targeted interventions for improving patient experience in urban municipal hospitals is limited.

Objective:

Identify specific targets in provider-patient communication for improving patient experience.

Design/Methods:

We conducted a prospective survey in a high volume urban ED from May - August 2015. The survey was developed emphasizing low scoring areas from Press Ganey data gathered in the last 2 years. The survey included 8 items on a 4 point likert scale, 1 item on a 10 point likert scale, 3 binary items, and 1 open ended item. All research assistants underwent training by the research coordinator to ensure surveys were administered uniformly. Patients surveyed were a convenient sample 18 years or older, and from all 3 shifts. The survey was given in a face-to-face interaction within 24 hours of their ED visit.

Results:

Of 256 patients, 40% self-identified as female, 60% African-American, 20% Latino, 9% Caucasian, and 11% other. Responses of Always or Usually were at least 80% for items pertaining to patients' perceptions of their providers' overall respect, effort to listen to patients' concerns and attention to pain management. Only 38% of the patients reported always being informed about delays and 73% felt their doctor always provided explanations about their care and discharge instructions in a way they understood.

Conclusion:

Our survey demonstrates opportunities for improved physician-patient communication regarding perceived delays and explanations of care. We are currently developing targeted innovative communication training and other interventions to improve our patient's ED experience. Subsequent investigations will measure effectiveness of interventions, and assess for any differences amongst ethnic groups in an inner city county hospital.

Impact:

Patient experience of an ED visit may differ when using targeted interventions related to communication, and timing of data gathering, which would be of interest to administrators, clinicians, and funding agencies as it relates to public hospitals



Trauma Survival Guide: An Introduction to Trauma Curriculum

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Background:

This guide is an introduction to trauma curriculum for 2nd year emergency medicine residents who rotate on the trauma surgery service at a busy level one trauma center. Acute management of critical trauma patients in the emergency department is a high stress, fast paced environment that requires quick decisions to determine which potentially life-saving interventions are necessary. This creates a steep learning curve for the novice emergency medicine resident and necessitates a solid foundation of knowledge in order to be a functional member of the trauma team.

Educational Objective:

After completing the curriculum the resident should have a broad understanding of acute trauma care with sufficient hands on practice to allow smooth transition to real life management. The resident will be given the resources necessary to practice evidence based medicine and allow for continued independent study.

Curricular Design:

The curriculum is comprised of three sections, which aim to teach via distinct methods.

The first part is an online written trauma guide that provides step-by-step instructions on how to manage the acute trauma patient. At each step in management it provides information on decision-making tools, landmark articles and resources to view videos demonstrating how to perform trauma specific procedures. The second part is a procedure lab in which each resident will perform the procedures necessary in trauma management. The final part teaches through hands on cases conducted in the simulation lab that reflect the fast paced nature of real life trauma. The simulation cases aim to transition the knowledge gained in the previous parts into practical skills and real time management.

Impact:

In the curriculum's inaugural year it has significantly eased the transition of emergency medicine residents into their crucial roles on the trauma service and given them the foundation of knowledge necessary for success.



A Novel Flipped-Classroom Curriculum for Intern Education

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Background:

Traditional conference education emphasizes lecture-based instruction. However, evidence supports non-traditional classroom teaching for this generation of millennial learners. Also, the conference setting is used to achieve a common foundation of knowledge, but scheduling demands can limit conference attendance. We have addressed both of these challenges by developing a flipped-classroom curriculum with stand-alone asynchronous content.

Objective:

We aim to achieve a common foundation of knowledge, skills and attitudes in interns using a flipped-classroom model. We believe that residents prefer a flipped-classroom approach to teaching and value dedicated online asynchronous resources

Design/Methods:

A group of educators identified a need to provide core content for interns, the breadth of which required a longitudinal year-long design. A needs assessment across two separate EM programs had confirmed the need for an intern curriculum (87% stated this would improve education) and learner interest in this format (84% favored dedicated conference time, 73% favored asynchronous resources). We created a website to host asynchronous resources (EMFundamentals.blogspot.com). Each content page includes goals and objectives as well as references (e.g. journal articles, podcasts, institutional guidelines). For interns attending conference, faculty-led small-group sessions reinforced key concepts. For interns unable to attend, web-based content delivery ensured a baseline knowledge. The assessment method for this phase was a post-curriculum attitudinal survey targeting preferred educational methods and use of asynchronous resources.

Results:

The post-curriculum survey had an 80% response rate (n = 12). Compared to traditional lectures, 75% of residents preferred the flipped-classroom model. 58% of residents reported referencing the asynchronous resources at least monthly and 100% of users reported these resources to have a positive impact on learning.

Conclusion:

Most residents prefer a flipped-classroom approach to conference and value dedicated asynchronous resources.

Impact:

A minority of programs currently include training level-specific breakout sessions during conference. This pilot suggests resident preference to further integrate this method of teaching into didactic sessions. If these findings are reproducible at scale and supported by Kirkpatrick level 2 and 3 evaluations which are currently in development, an overhaul of traditional conference education will be warranted.



Procedural and Resuscitation Curriculum Addition to the Emergency Medicine Anesthesia Rotation

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Background:

Early and longitudinal exposure to procedures important in emergency medicine (EM) training. Sufficient experience with resuscitations and invasive procedures is a requirement of EM residency, but high yield procedural educational opportunities can be limited in a busy high acuity ED.

Educational Objective:

To optimize first year EM resident (EM-1) experience with resuscitations and procedures, we modified our required Anesthesia rotation to include a resuscitation/procedural component. Our goal was to increase EM-1 exposure to resuscitations and procedures, to improve the quality of procedural educational activities and to increase satisfaction during the rotation, all while meeting the original rotation objectives.

Curriculum Design:

The current EM-1 Anesthesia rotation consists of 2 weeks working with anesthesiologists to perform endotracheal intubations. Residents move between operating rooms (OR) to identify anesthesiologists to supervise intubations and airway procedures. This system leads to open, non-structured time between cases. Our curricular modification included an email notification to the EM-1 rotating on Anesthesia the week prior to beginning the rotation. Residents were asked to post their portable phone number in the ED so trauma and medical resuscitation alerts in the ED could be forwarded to them by the ED secretary. Residents continued to pursue intubations in the OR. When the ED alerted them to a resuscitation or procedure, if the EM-1 was not involved in the OR, they would go to the ED to participate in the resuscitation/procedure.

Impact/Effectiveness:

A survey was given to all 12 EM-1 residents at the end of the year. Eighty three percent of residents support continuing this curricular modification, and 100% of residents were either very satisfied or satisfied with the rotation. The average number of procedures/resuscitations was 3. A majority, 66% of residents felt they had more time to perform procedures than when on an standard ED shift, and 25% felt more comfortable with the management of critically ill patients after the rotation. The biggest obstacle was ER Staff awareness to the curriculum changes. This simple but effective modification could easily be adapted to other rotations with periods of unstructured time.



Self Directed Learning through Ultrasound Simulation: A Feasibility Study

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Courtney Hutchins, BS, Errick Christian, MS, John Bailitz, MD;
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Background:

Clinical ultrasound (CUS) utilization continues to increase across medicine, from practicing physicians to medical student education. Evidence suggests that simulator training is comparable to human models when learning the Focused Assessment with Sonography in Trauma (FAST) US exam.

Objective:

The purpose of this pilot study was to measure the effectiveness of incorporating a novel US simulator into medical student ultrasound training in addition to assessing students' attitudes concerning its use.

Design/Methods:

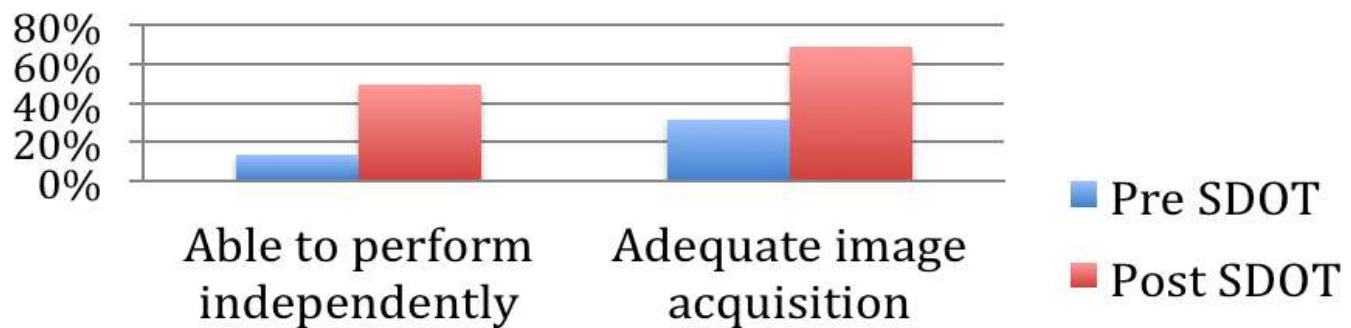
This prospective observational study was performed January-February 2016 during a first-year medical student CUS elective. Students had no prior FAST training. A pre-survey assessed attitudes of online learning and exposure to simulation technology. A validated FAST Standardized Direct Observation Tool (SDOT) assessment was administered independently to students by Emergency US faculty (EUSF) or fellow. A review of FAST image acquisition was then provided. Each participant was given a SonoSim US simulator and one week to complete the educational intervention. The intervention included a SonoSim online didactic and 5 cases requiring image acquisition and interpretation. After one week, students reviewed recorded case images with the EUSF and a post-educational intervention FAST SDOT was performed. Students completed a post-survey assessing attitudes towards future use.

Results:

The average age was 23.7 (58% female, 42% male). All students completed the pre-survey. Regarding interest in use of simulation technology, 9% were extremely interested, 61% were eager to learn more, and 30% were somewhat interested.

21 of 23 students completed the post-survey. 90% reported 1-3 hours of independent learning and 10% reported 3-5 hours required for completion of the didactic and five cases. Reported ease of use, 5% were neutral, 57% somewhat easy and 38% very easy. 52% liked and 48% loved utilizing the SonoSim. 100% replied that they would be interested in future use of the SonoSim.

Comparison of pre and post SDOT statistics



Pre SDOT CI (95%, 0-27%), Post SDOT CI (95%, 28-68%)
 $p < 0.001$