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Factor Eight Inhibitor Bypassing Activity (FEIBA) for the Rapid Reversal of Major Bleeding in Patients with Warfarin Induced Coagulopathy

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Background: Major bleeding associated with coagulopathy due to warfarin has been traditionally reversed with fresh frozen plasma (FFP) and IV vitamin K. Shortcomings of FFP include incomplete reversal, time delay for ABO compatibility and thawing, large volume, and time of administration. In 2012, the American College of Chest Physicians recommended the use of prothrombin complex concentrates (PCC) to reverse coagulopathy in these patients. While not a traditional PCC, Factor Eight Inhibitor Bypassing Activity (FEIBA) is a plasma-derived product containing 4 coagulation factors (II, VII, IX, X).

Objectives: To evaluate the efficacy and safety of FEIBA and IV vitamin K for the rapid reversal of warfarin-associated coagulopathy in patients with major bleeding, by measuring the time to lower INR to \leq 1.5 and the incidence of thrombotic adverse events. We hypothesize that FEIBA will provide rapid reversal of coagulopathy with a low rate of adverse events.

Methods: In this prospective observational study, we enrolled consecutive patients presenting to the Emergency Department with warfarin-associated coagulopathy (INR > 1.5) and major bleeding as defined by the International Society on Thrombosis and Haemostasis. Following new 2012 hospital guidelines, patients received FEIBA using an INR based dosing strategy as well as 10 mg IV vitamin K. Patients receiving alternative reversal agents were excluded. Primary outcome was time required to lower INR to \leq 1.5. Secondary outcomes included thrombotic adverse events and hospital length of stay. Patients received 28-day follow-up through chart review and phone calls by investigators to patients or primary physicians. Retrospective chart review was performed on patients not able to be consented and for a comparison patient cohort treated prior to 2012 with FFP.

Results: Results from 43 patients receiving FEIBA between February 7, 2013 and December 5, 2013 were analyzed. Median initial INR was 4.0 (2.7,7.3 IQR). Three patients died before achieving target INR. Four patients had at least 12 hour delays in subsequent INR testing. In the remaining 36 patients median time to INR \leq 1.5 was 46 minutes (40,80 IQR). Seventeen (40%) patients died. Eleven thrombotic adverse events occurred in 6 (14%) patients; 4 events were potentially related to FEIBA administration. In 36 patients with similar presentations treated



with FFP prior to 2012, 13 patients had at least 12 hours delays in subsequent testing, 5 did not achieve INR \leq 1.5; median time to INR \leq 1.5 in the remaining 18 was 340 minutes (273,419 IQR).

Conclusion: FEIBA and vitamin K administration result in rapid reversal of warfarin-induced coagulopathy in patients presenting with major bleeding. Thrombotic adverse events occurred in 14% of patients.



Diagnosing Acute Heart Failure in Patients with Undifferentiated Dyspnea – The LuCUS Protocol

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Study Objective: Five million Americans have Congestive Heart Failure (CHF) and more than 650 thousand are diagnosed annually. Many of these patients present to the emergency department (ED) with acute undifferentiated dyspnea. The primary goal of this study was to determine the accuracy for diagnosing acute HF in the undifferentiated dyspneic ED patient using a novel 12 view Lung and Cardiac Ultrasound (LuCUS) protocol. Secondary goals focused on acute changes in management based on these ultrasound findings.

Methods: This was a prospective, observational study of adult patients performed at a busy urban tertiary care teaching hospital. Intervention consisted of a LuCUS protocol performed by experienced emergency physician (EP) sonographers. The primary objective was measured by comparing pre and post-ultrasound diagnoses to overall final diagnoses. Final diagnoses were determined independently by two blinded physicians, through a rigorous chart review. Secondary objectives assessed acute changes in management and clinician's level of confidence in their diagnosis.

Results: We enrolled 104 patients and had complete data on 99. Of the 99 patients, 36% had a diagnosis of acute HF. The overall sensitivity, specificity, positive and negative likelihood ratios of the LuCUS protocol are 83% (67-93 Cl), 83% (70-91 Cl), 4.8 (2.7-8.3 Cl) and 0.20 (0.09 – 0.42 Cl), respectively. Overall, accuracy improved by 20.2% (8-31 Cl of the difference) over clinical gestalt alone. The LuCUS protocol changed management in 48% of patients including 42% with changes in treatment, 12% with changes in disposition, 8% with changes in level of care and 8% with a new consult. 92% of clinicians felt more confident in their primary diagnosis after the LuCUS protocol.

Conclusion: This novel protocol when performed by an experienced EP is accurate for diagnosing acute HF and provides improved accuracy over clinical gestalt alone. This protocol helps guide acute management and increases EP's confidence in their diagnosis.



Ecologic Factors Relating to Firearm Injuries and Gun Violence in Chicago

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Objectives: Gun violence is a major burden on Chicago with greater than 1500 gunshot wounds and more than 17000 acts of gun-related crime occurring annually. Identifying ecologic variables related to the incidence of firearm-related injuries and crime could prove useful for developing new strategies for reducing gun-related injuries.

Methods: The Illinois Trauma Registry (ITSR) and the Chicago Police Department's CLEAR (Citizen Law Enforcement Analysis and Reporting) dataset were retrospectively analyzed to investigate group-level factors potentially related to the incidence of gunshot wounds and gun crime in Chicago from 1999 through 2012. Multivariate linear regression and t-tests were used to evaluate the effects of day of the week, daily maximum temperature, precipitation, and snow on the daily incidence firearm-related violence and injuries.

Results: A total of 18655 gunshot wounds occurred during the study period (ITSR, 1999 – 2009). There were 156866 acts of gun violence identified in the CLEAR dataset (2002 – 2012). Day of the week, higher daily maximum temperature, and precipitation were found to be associated with differential risks of gun injury and violence. Rain decreased gun injuries by 9.80% (4.98 – 14.62%) [ITSR] and gun-related crime by 7.00% (5.00% - 8.99%) [CLEAR]. Gunshot wounds were 33.4% (29.3% - 37.0%) more frequent on Fridays and Saturdays [ITSR] and gun crime was 18.1% (16.4% - 20.0%) more common on these days [CLEAR]. Snow was not associated with gunshot wounds or gun crime.

Conclusion: Day of the week, daily maximum temperature, and rain are associated with the daily incidence of gunshot wounds and gun-related crime. Understanding the effects of these group-level variables may allow for the development of predictive models and for risk-adjusting gun crime and injury data.



	Firearm Injuries (ITSR) Gun Crime (CLEAR)	
Daily Max. Temp. (F)	RR (CI 95%)	RR (CI 95%)
0 - 10	0.54 (0.34 - 0.74)	0.66 (0.68 - 0.80)
10 - 20	0.62 (0.53 - 0.72)	0.70 (0.62 - 0.75)
20 - 30	0.66 (0.59 - 0.73)	0.79 (0.75 - 0.83)
30 - 40	0.77 (0.71 - 0.82)	0.83 (0.80 - 0.86)
40 - 50	0.84 (0.77 - 0.90)	0.91 (0.87 - 0.94)
50 - 60	0.92 (0.85 - 0.99)	1.00 (0.97 - 1.03)
60 - 70	0.95 (0.88 - 1.03)	1.04 (1.01 - 1.07)
70 - 80	1.23 (1.15 - 1.32)	1.22 (1.09 - 1.16)
80 - 90	1.39 (1.30 - 1.47)	1.18 (1.15 - 1.21)
90 - 100	1.34 (1.23 - 1.50)	1.10 (1.02 - 1.15)



Can Initial Clinical and Demographic Information Predict Emergency Department Disposition?

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Research Objective: Emergency department (ED) overcrowding results in delays, decreased patient satisfaction, lower throughput and inefficient capacity management. As delays in procuring inpatient bed for ED patient results in extended ED length of stay for these patients and affects ED patient flow, proactive approach to predict admission early in the ED visit needs to be investigated. Based on clinical experts at a large, urban Academic Medical Center (AMC) with 60 ED beds, a typical inpatient admission decision is frequently evident within the first 30-60 minutes of a patient's treatment. Thus the study goal is to identify specific variables and clinical information gathered during the initial stages of an ED visit of adult patients that are highly predictive of ED disposition (i.e., admitted vs discharged).

Study Design: The study design is retrospective cross-sectional.

Population Studied: This study evaluated demographic and initial clinical information (e.g., age, gender, mode of arrival, chief complaint category, acuity, vital signs, level of consciousness, and presence of cancer and other chronic conditions such as diabetes, hypertension, asthma, and cardiac problems) for adult ED visits at the AMC who were either admitted or discharged. The patients excluded from the study were pediatric (<18 years), psychiatric, transferred out, labor and delivery, left without being seen and absconded from the ED. The model generation sample (training) was from January 6, 2012 to December 31, 2012, while the model validation sample (testing) was between January 1, 2013 and October 31, 2013. Predictive models were built using logistic regression and decision rules. Models were evaluated using sensitivity, specificity, and accuracy.

Principal Findings: Based on initial results, most of the variables were significant and the prediction accuracy of the logistic regression model was 80%. While the prediction accuracy for decision rule model was 85% for both training and testing data sets. The sensitivity and specificity was 69% and 92%, respectively for decision rule model. Some of the most prominent rules included interactions between acuity, temperature, and presence of cancer and chronic conditions (i.e., cardiac problems, hypertension, and diabetes). For example a sample rule was "IF temperature between 94.50F and 96.90F (hypothermia) and acuity is medium THEN patient is admitted" with confidence/strength of 94%.

Conclusions: Clinical information collected during the triage/initial stages of ED treatment (i.e., higher acuity, hypothermia, presence of chronic conditions) is predictive of inpatient admission.



Additional information from the physician evaluation (medical screening exam) could further improve the model performance. Thus, a future automated real-time predictive models could be used to generate probability of admission scores (PAS) during ED triage/initial stages of treatment. Instances with higher PAS could then be communicated to both ED clinician and bed management to expedite inpatient admission.

Implications for Policy and Practice: Early predictions of inpatient admission and subsequent parallel processing of bed request will result in reduced patient boarding, improved system-wide communication and coordination, and reduced ED overcrowding. The impact of implementing prediction models will not only improve patient flow within the ED but also across the hospital system. Similar predictive models could be developed for other sources of admissions as well as for predicting clinical outcomes.



Can Emergency Physicians Accurately Diagnose and Correctly Classify Diastolic Dysfunction Using Bedside Echocardiography?

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Background: Fifty percent of patients with heart failure have isolated diastolic dysfunction (DD), which, when compared with systolic heart failure, has different treatment strategies and prognostic implications. If Emergency Physicians (EPs) can correctly diagnose DD at the bedside, it would allow rapid improvement in medical management and patient disposition.

Objectives: The goal of this study was to determine if EPs, with minimal additional training in echocardiography beyond what is learned in residency, can correctly perform a bedside diastology examination (DE) and properly grade the level of diastolic function. We hypothesize that EPs, when compared with a cardiologist, will be accurate at detecting and grading DD.

Methods: We conducted a prospective observational study on a convenience sample of adult patients who presented to an urban ED with a chief complaint of dyspnea. All patients had a bedside echocardiogram, including a DE, performed by an EP-sonographer who had 6 hours of didactic and hands-on echocardiography training with a cardiologist. The DE was interpreted as normal, Grade 1-3 if DD was present, or indeterminate, all based on pre-defined criteria. This interpretation was compared to that of a cardiologist who blindly interpreted the EP's images.

Results: We enrolled 62 patients; 52% had DD. Using the cardiology interpretation as the gold standard, the sensitivity and specificity of the EP-performed DE to identify abnormal diastolic function were 100% (95% CI 0.83-1.0), and 44% (95% CI 0.21-0.69), respectively. Agreement between EPs and cardiology was assessed using kappa and weighted kappa. For all DEs, κ =0.35 (95% CI 0.20 to 0.49), and weighted κ =0.46 (95% CI 0.31-0.61). Overall, EPs rated 31% of DEs as indeterminate, compared with only 16% by cardiology. For DEs where both EPs and cardiology attempted an interpretation (indeterminates excluded) κ =0.34 (95% CI 0.15 to 0.53), and weighted κ =0.46 (95% CI 0.28-0.64).

Conclusion: EPs are increasingly performing complex exams using point-of-care sonography, generally with excellent accuracy. Although we were able to show that EPs can correctly identify normal versus abnormal diastolic function, successful grading of DD, when compared to a cardiologist, was only moderate, at best. Our results suggest that EPs should use caution when attempting to grade DD until further studies can demonstrate improved EP performance.



Implementation of a Triage Protocol Reduces Left Without Being Seen Rates for Patients with Abdominal Pain

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Background: Overcrowding in emergency departments (ED) has increased the time patients wait to see a physician, prompting many to leave prior to evaluation. Studies have shown patients who leave without being seen (LWBS) by a physician are often ill and have poor outcomes, but cost effective solutions to reduce the LWBS rate have been difficult to ascertain. Our ED developed a protocol in February 2010 to reduce LWBS rates for patients presenting with abdominal pain that allows nurses to order and collect blood tests before physician evaluation.

Objective: To compare the LWBS rate of patients who presented to ED with abdominal pain before and after the institution of this protocol. We hypothesized that the LWBS rate would demonstrate a measurable and significant decrease after protocol introduction.

Methods: We determined that a sample size of 1244 patients in each group would allow us to determine a 50% reduction in LWBS rate after the institution of the triage protocol. Patients who were 19 years of age or older and presented with a chief complaint of abdominal pain were identified by searching our electronic medical record (EMR) for the keywords "abdominal", "abd", "epigastric", "suprapubic", "quadrant", "LLQ" and "RLQ". Patients who arrived by ambulance, or were not triaged for other reasons, were then excluded. Disposition was abstracted from the EMR. Basic demographic information was also collected.

Results: We identified 1360 patients before and after the initiation of our protocol. In the before group, 1160 patients met criteria to be included. The median age was 38 years (IQR 27-53), and 829 (71.5%) were female. There was a 6.55% LWBS rate, with an average length of stay (LOS) of 5 hours and 9 minutes (IQR 3:34-7:20). After the protocol was introduced, 1168 people met criteria to be included. The median age was 40 years (IQR 28-55) and 827 (70.8%) were female. There was a 4.53% LWBS, with an average LOS of 5 hours and 32 minutes (IQR 3:45-7:29). Using chi square analysis, the difference between LWBS rates (6.55% vs 4.53%) was significant (p=0.042), with an OR of 1.48 (95% Cl of 1.02-2.12) for LWBS after the introduction of the triage protocol.

Conclusion: The addition of testing protocols initiated by a nurse at the time of triage decreased the LWBS rate of patients presented to our ED with the complaint of abdominal pain despite having no effect on LOS.



Predictors of Psychiatric Boarding in the Emergency Department

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Objective: Identify differences between psychiatric patients who boarded in the Emergency Department (ED) versus patients who did not board, as defined by the American College of Emergency Physicians as a length of stay in the ED less than four hours from time of disposition to transfer.

Methods: We performed a retrospective multicenter cohort study of patients assessed to require inpatient psychiatric hospitalization at two community EDs from July 1, 2010 through May 10, 2013. All patients requiring inpatient psychiatric hospitalization were included. Exclusion criteria consisted of patients under 18, patients over 65, patients who required medical stabilization, pregnant patients, and patients discharged from the ED. A total of 910 patients met inclusion criteria and 671 qualified after exclusion criteria were applied. Patient data including insurance status, sex, age, restraint use, time of arrival, time of disposition and time of transfer were collected. Data were analyzed using SPSS software. Chi Square analyses were conducted to compare insurance status between cohorts of ED boarders and nonboarders. An ANOVA test was used to analyze differences in time to disposition and time from disposition to transfer between the different insurance status groups. Insurance status and likelihood of bounce back data were analyzed through generalized linear models specifying a binomial distribution and logit link function to test the importance of the predictor variables. Restraint use data were examined using a linear regression model applied to time from ED presentation to disposition, time from disposition to transfer (boarding time), and total minutes spent in the ED.

Results: There was a statistically significant difference in the insurance status between the cohort of patients boarding in the ED compared to nonboarders prior to inpatient psychiatric admission. Our study identified 95.4% of uninsured patients were boarded in the ED, compared to 71.8% of Medicare/Medicaid patients and 78.3% of patients with private insurance (χ 2=50.6, df=2, p<0.001). In addition, we found the length of stay to be longer for patients transferred to publicly funded psychiatric facilities when compared to those transferred to private facilities, with a mean time spent in the ED of 1661 minutes and 705 minutes, respectively (p<0.001). Secondary outcomes identified that patients with Medicare/Medicaid were nearly twice as likely to return to the ED for psychiatric emergencies than self pay and privately insured patients, requiring repeat inpatient psychiatric admission (estimate=0.649, p=0.035, OR=1.914). Furthermore, there was a statistically significant (t=2.309, p=0.021) correlation of involuntary parenteral medication or physical restraints on total minutes spent in the ED adding 172.70 minutes (+/- 74.820). The correlation of involuntary parenteral medication or physical restraints on time from ED presentation to disposition approached statistical significance (t=1.836, p=0.0622) adding 30.74 minutes (+/- 16.459). The correlation of involuntary parenteral medication or physical restraints on time from patient disposition to transfer approached statistical significance (t=1.953, p=0.0512) adding 140.96 minutes (+/- 72.16).



Conclusion: This study identifies an underserved population of psychiatric patients who requires more frequent inpatient psychiatric admission. Furthermore it highlights the importance of judicious use of involuntary parenteral medication and physical restraints on psychiatric patients in the ED as it may increase their overall length of stay and affect overall ED efficiency. We hope to bring attention to the need for increased psychiatric services for this group as well as improve emergency room efficiency and allocation of resources for psychiatric patient care.



Trends in Malpractice Claims on Emergency Physicians: Time and Money

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Introduction: The passage of the Affordable Care Act (ACA) in 2010 has placed our health care system at the forefront of the domestic policy agenda. While the ACA includes efforts to increase the percentage of Americans with health insurance and decrease associated costs, there was no serious element of tort reform included in the law. Physicians, and particularly emergency physicians, face significant malpractice liability which imposes considerable financial and emotional costs. Our study supplements prior data which shows the substantial expenditure of time and money that result from our current tort system.

Study Objectives: Provide practicing emergency physicians with further guidance as to what can be expected if they are confronted with a medical malpractice claim and contribute to the literature as the issue of health care costs and tort reform is debated.

Methods: This is a retrospective study of malpractice claims outcomes from Illinois State Medical Interinsurance Exchange (ISMIE) covering all closed claims involving Emergency Physicians (EP) for the 15 year period 01/01/1995 to 12/31/2009. Data included the claimant's age, gender, time from incident to claim, time from claim to close, whether a lawsuit or attorney lien was actually filed and served, expenses paid (if any), and indemnity paid (if any). Descriptive statistics are reported as mean values and standard deviation (SD) or as median and interquartile range (IQR). All subset comparisons are made using Student t-test, Anova or Kruskal-Wallis as appropriate. Statistical significance is set at a twotailed P-value<0.05.

Results: There were 838 closed claims reviewed over 15 years. Of these, 476 (56.8%) did not proceed to a law suit, 282 (33.7%) proceeded to suit with no indemnity paid, and 80 (9.5%) proceed to suit with indemnity paid. During the 15 year study period, claims filed increased 133% while those proceeding to suits increased 99%. The median indemnity paid for 80 claims was \$375,000 (IQR: \$131,250 to \$750,000) and there was a trend (p=0.124) from \$210,000 to \$525,000 in the median sum paid during the 15 year period. Suits with indemnity had on average \$16,000 more in expenses than suits without indemnity paid (p<.001). For all suits, expenses averaged \$42,221 with a significant (p=.030) increase from \$37,748 to \$52,215 during the study period. If a claim proceeded to suit, the time to close jumped from 3.9 months to 33.3 months (p<.001). Although there was a drop the middle of the study period, mean time to closure for suits ended near where they started.

Conclusion: This study reveals that there has been a steady increase in the number of claims filed against EPs in Illinois during the 15 year period 01/01/95 to 12/31/2009. There was a trend toward greater indemnity payouts and higher expenses, but a consistent length of time from claim to close.

Key Words: Emergency Physicians, Malpractice Claims, Time, Indemnity, Expenses



The Development and Pilot of an Undergraduate Medical Education Consultation Curriculum

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Background: The importance of interprofessional communication is emphasized by the LCME and ACGME. An important area of communication is the consultation process. Existing literature suggests formal education in consult communication is lacking at all levels of medical training. There must be a formal approach to requesting consultations, rather than the error prone "curbside consultation." We believe a consultation curriculum based on the 5 Cs of Consultation, a validated model, will help address this deficiency. The specific aim of this project is to develop and pilot a consultation communication curriculum for undergraduate medical education using simulation technology during the emergency medicine (EM) clerkship. We hypothesized students will have greater consult communication efficacy after receiving this curriculum.

Methods: A targeted needs assessment was completed with the administration of a survey given to all third-year medical students (MS3s). The survey assessed the students' knowledge of and experience with the consultation process, as well any instruction the students have received.

The curriculum and assessment took place during the simulation experience of the EM clerkship. Fourthyear medical students (MS4s) received a didactic lecture, participated in a practice session, and were subsequently required to call consultations while managing cases in the simulation lab. Two evaluative tools, the 5 Cs Model Checklist and Global Rating Scale (GRS), were completed by attending physicians for each consultation called by the students during the simulated cases and used to measure the efficacy of the curriculum. Changes in the average checklist completion and GRS values pre- and post-curriculum implementation were analyzed using one-tailed, unpaired Student's t-tests.

Results : The MS3 targeted needs assessment showed that 93% of students reported calling a consultation for a patient in their care during third-year rotations, and 24% reported having received feedback on their consultation abilities. Less than half of MS3s rated they were comfortable requesting a consultation. In the MS4 cohort, the combined average score of the criteria measured in the GRS increased significantly following the implementation of the consultations educational curriculum (p < 0.01). Additionally, consultations performed after the implementation of the curriculum scored significantly higher in six of the seven individual criteria on the GRS (p < 0.05). The educational curriculum also increased the 5 Cs checklist completion of three of five criteria, along with the total checklist completion as a whole (p < 0.05).



Conclusions: Most medical students at the Pritzker School of Medicine are calling consultations during their third-year clerkships, and yet formalized instruction and comfort of the student in this practice is lacking. The implementation of a formal educational curriculum in demonstrating a standardized approach to calling consultations significantly increased the thoroughness and perceived efficacy of consultation communication in MS4s. This is the first study examining a standardized educational curriculum for calling consultations based on a previously validated model.



Complications and Estimated Costs of Patients Eligible for Outpatient DVT Management at a Public Hospital

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Background: The safety of outpatient deep vein thrombosis (DVT) management has been well studied and established as standard of care based on large randomized control trials mostly in large group HMOs. However at many public hospitals serving the uninsured, inpatient treatment is still the practice due to concerns of non-compliance and lack of outpatient protocols. This has significant impact on not only healthcare economics but also emergency department efficiency by increasing ED boarding.

Objectives: We aim to establish simple outpatient protocols in an under funded system and demonstrate that outpatient DVT treatment can be both safe and cost effective.

Methods: For the first phase of this two-part study, we conducted a retrospective chart review. The records of all patients who were admitted for a diagnosis of DVT between 12/01/2010 and 11/29/2011 were examined. Of these patients, we identified those who may have been managed as outpatients based on the absence of high-risk parameters or other indications for admission. These patient charts were then monitored for patient complications after discharge, specifically significant bleeding or pulmonary embolism.

Results: During the one year period, 185 charts were reviewed. Of these, 175 patients had a true diagnosis of DVT, excluding false positives. Of the true DVTs diagnosed, 56 patients (32%) were eligible for discharge. Of those, one patient was documented to have a pulmonary embolism, for which she returned to the emergency department and successfully completed treatment without complications. No patients in this sample were documented to have bleeding complications. Incidentally, the average length of stay of potentially dischargeable group in the ED and inpatient wards was 12 hours and 30 hours, respectively.

Conclusion: Approximately 1/3 of patients in our sample could be managed as outpatients with little risk of poor outcome. This results in lower healthcare expenditure by reducing not only unnecessary admissions but also ED boarding. But further prospective analysis is necessary. Based on this chart review, we collaborated with the internal medicine department to establish a simple outpatient treatment protocol. We hope to demonstrate prospectively that patients managed through the new outpatient protocol have no difference in outcomes from those patients who were treated as inpatients in the prior system.



Innovation in Emergency Medicine Resident Assessment of ACGME Mandated Patient Centered Communication and Professional Values Milestones, Utilizing Standardized Patient Objective Structured Clinical Examinations (OSCEs)

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Background: There is a lack of assessment of prior communication skills and training in EM residents and no standardized method to evaluate communication and professionalism milestones as recently mandated by ACGME.

Objectives: Quantify prior learner experience, assess communication milestones across six standardized patient (SP) scenarios, and utilize results for future curriculum modification.

Methods: Communication and professionalism experience of residents was quantified via survey. Using a mapping method, EM faculty integrated the milestones into a validated Communication and Interpersonal Skills (CIS) Scale, a four-category behaviorally anchored rating scale. Six communication-focused scenarios were identified: death notification, informed consent, medical non-compliance, medical error, treatment refusal, and advanced directives. For each case, SPs rated residents on a case-specific checklist and the CIS scale. Each encounter lasted ten minutes with a five minute post-encounter activity and ten minutes for SP-to-resident debriefing. Piloting consisted of eighteen residents; one case was omitted from analysis due to missing data.

Results: For the medical non-compliance case, all but one resident reported performing this task six or more times, whereas for the medical mistake case, six residents reported no experience and eight residents reported three or fewer prior experiences. Despite prior experience, average CIS scores were approximately 70% for most cases (Fig. 1). Although 47% of residents performed the advanced directives task six or more times, the class average was 67% (SD = 7%). Across the five scenarios, the average correlation between experience performing task and CIS scores was \overline{r} = -0.07 (range = -0.29 to 0.42); and between having been observed performing a task and CIS score, \overline{r} = -0.05 (range = -0.46 to 0.14).

Conclusion: Communication and professionalism milestones are difficult to evaluate. SP encounters can support reliable, standardized direct observation which can be correlated to milestones. Our survey and performance data quantified the deficiencies, prompting the education faculty to establish protected time for EM residents to address this using simulation. Our sample size does not support definitive inferences; however, preliminary data suggests prior experience alone does not correlate strongly with



improvements in communication skill. Further study is needed to define resident communication milestone improvement after SP debriefing.





Interpretation of Plain Film Radiographs: What are Current Teaching Methods for Emergency Medicine Residents?

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Background: Due to ACGME work restrictions and the busy nature of the ED, opportunities for Emergency Medicine Residents (EMRs) to learn the fundamentals of plain film xray interpretation are limited. Currently, there is no standardized curriculum for teaching EMRs this vital skill.

Objectives: This was a needs based assessment study to determine the existing formats through which EMRs are being taught to read plain film in order to help guide the development of a standardized curriculum.

Methods: We performed a self-administered, anonymous, voluntary survey of EMRs attending the ICEP Spring Symposium in May 2013. The survey was piloted among a group of fellows and attendings, and revised based on initial performance. The final survey contained 10 questions with binary, categorical, free-text, and four-point Likert scale responses. Responses were analyzed using simple descriptive statistics.

Results: 141 EMRs completed the survey. Plain film learning modalities reported by EMRs included: Lecture 61% (77/127), Elective rotation 65% (83/127), Workshop/small group 21% (27/127), Online Training 10% (13/127). Interest in online radiology training was 93% (122/133). 87% (123/141) of EMRs reported being accurate in greater than ½ of their interpretations, and 13% (18/141) reported being accurate in less than ½ of interpretations. Self-reported misreads included: Delays in diagnosis 26% (37/141), Missed fractures 31% (44/141), Morbidity 9% (13/141), and Mortality 2% (3/141). EMR interpretation errors resulted in various complications, including misdiagnosed fractures, missed pneumonia, and unnecessary chest tube placement. EMRs reported highest perceived knowledge reading chest xrays, 97% (130/134); and felt least knowledgeable reading spinal films: C-spine 57% (76/134), T-spine 54% (73/134), LS-spine 59% (79/134).

Conclusion: In this needs assessment study, EMRs' responses show that there is no standardized method for learning plain film radiology, and thus adverse patient outcomes from misinterpretations are common. Most EMRs expressed interest in an online training modality, which may be developed to help improve and standardize resident education.



Reasons Why Patients Use the Emergency Department: A Qualitative Study

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Study objective: Previous studies examining why patients use the emergency department (ED) have restricted their sample to specific populations e.g., uninsured or low-acuity patients. Better understanding of patients' reasons for using the ED may inform patient-centered improvements in providing acute care. This study aimed to more inclusively assess patients' reasoning for seeking care in the ED.

Methods: This cross-sectional, qualitative study involved conducting semi-structured, face-toface interviews with patients while in the ED to assess how they decided to seek medical care in the ED, their goals and expectations of care in the ED, and how previous experiences with medical care influenced their decisions. Triage scores were assessed using the Emergency Severity Index (ESI). Interviews were audio-recorded and transcribed verbatim. Transcripts were independently coded by two members of the research team and analyzed for content and themes. Inter-coder reliability was kappa > 0.8. A secondary analysis assessed whether patients with emergent triage scores (ESI 1,2) differed from patients with non-emergent triage scores (ESI 3-5) in their reasons for seeking care in the ED.

Results: Of sixty-one eligible patients, 47 (77%) consented to participate, 5 interviews were not completed because of medical reasons, 42 transcripts were analyzed. Patients used the ED primarily because they had symptoms that caused distress in the form of physical discomfort or psychological worry (41, 98%). They chose the ED for their care because: they felt they would have an improved outcome (36, 86%), others advised them to come to the ED (31, 73%), the ED was more convenient (15, 36%), and they felt like they had nowhere else to go (15, 36%). No themes were unique to patients with emergent or non-emergent triage scores.

Conclusions: Patients sought care in the ED for symptoms that cause physical or psychological distress. Although convenience and lack of access were important reasons for some patients to use the ED, patients more commonly sought care in the ED because they felt it would provide the best treatment. Efforts to improve patient access to outpatient care may not be effective in decreasing ED visits if patients continue to believe the ED provides the best care for them.



Time to Intubating Conditions and Muscle Relaxation After Intramuscular Injection of Paralytics: A Review of the Literature

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Background: Intravenous administration is the standard route of delivery for paralytics used in rapid sequence intubation. However, for patients with challenging vascular access in the Emergency Department (ED), intramuscular delivery may be desired or necessary. Intravenous succinylcholine and rocuronium achieve adequate paralysis for intubation in 45 to 60 seconds. We sought to explore whether intramuscular succinylcholine and rocuronium have sufficiently rapid onset for endotracheal intubation.

Objective: To examine the literature for information on the onset of succinylcholine and rocuronium in patients requiring endotracheal intubation.

Method: A literature search using Ovid Medline identified 11 studies on the neuromuscular blocking characteristics of intramuscular succinylcholine or rocuronium. Of the 11 studies, 8 were selected which met the inclusion criteria of evaluating clinical onset of the medication or the proportion of patients with adequate intubating conditions. Onset of medications was a composite endpoint for comparing the drugs, determined by time to complete paralysis. Complete paralysis in the studies was determined by methods including train of four monitoring, complete twitch depression, onset of apnea, and total relaxation of the vocal cords and extremities. Another endpoint for comparison was the proportion of patients with clinically adequate intubating conditions at three to four minutes.

Results: Mean onset of 4mg/kg intramuscular succinylcholine in children ages 1 to 10 ranged from 2.9 to 3.9 minutes, with a combined mean onset of 3.1 minutes in 73 patients. Mean onset in adults ranged from 1.8 to 4.2 minutes, with a combined mean onset of 2.4 minutes in 48 patients. Mean onset of 1.8 mg/kg intramuscular rocuronium in children ages 1 to 5 ranged from 5.2 to 8.9 minutes, with a combined mean onset of 7.7 minutes in 28 patients. No trials were available for adults. Additionally, 40 of 40 children (100%) given 4mg/kg intramuscular succinylcholine and 16 of 23 (69.6%) of children given 1.8mg/kg intramuscular rocuronium had clinically adequate intubating conditions when intubated at 3-4 minutes.

Conclusion: In the literature reviewed, intramuscular succinylcholine's onset was more rapid than that of rocuronium in the pediatric population. Succinylcholine was also more reliable at providing clinically adequate intubating conditions at three to four minutes. With a sufficiently quick onset, intramuscular administration of succinylcholine may be an alternative for patients with difficult vascular access requiring intubation.



Congruency of Disposition after Emergency Department Intubation in a Regional Database

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Background: A recent analysis of the accuracy of data contained in the National Hospital Ambulatory Medical Care Survey (NHAMCS) found that one fourth of ED visits had dispositions incompatible with that expected after an ED intubation. This raises serious questions about the data quality of NHAMCS, which may change the interpretation of published articles and future inquiries that utilize this database. The Illinois Department of Public Health (IDPH) Trauma Registry is a large database maintained by professionals with experience in medical chart abstraction and data entry that may offer a higher quality of data for use in large dataset studies.

Objectives: We analyzed the IDPH Trauma Registry to determine what percentage of patients intubated in the ED had dispositions congruent with such a procedure. Given the high quality of this dataset, we hypothesized that no incongruent dispositions would exist.

Methods: We reviewed data from the IDPH Trauma Registry between 2004 and 2012 on all patients meeting criteria for activation of our Trauma Service and subsequently requiring intubation in our ED. We analyzed time of presentation, length of stay, discharge time and discharge destination.

Results: A total of 2384 trauma patients were intubated during the 9-year period. 12 patients (0.5%, 95% CI 0.29% to 0.87%) had discharge dispositions that were atypical for a patient intubated in the ED, defined as discharge to home within 24 hours of admission. Of these intubated patients, 9 patients had negative workups and were subsequently extubated and discharged home within 24 hours. 2 patients were intubated for surgical procedures performed in the operating room, were extubated post-operatively and discharged home within 24 hours. Only 1 patient entry (0.04%, 95% CI 0.01% to 0.2%) was found to be erroneous.

Conclusion: The low percentage of patients in the IDPH Trauma Registry with incongruent dispositions after ED intubation suggests that the quality of data in the IDPH Trauma Registry offers improved reliability for studies based on this dataset.



The Effect of Psychiatric Patient Boarding Times in the Emergency Department Following Closure of a Public Psychiatric Hospital

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Objective: Recently, a 75-bed state operated inpatient psychiatric hospital closed near our hospital system. We analyzed the effect of closing this public mental health facility on psychiatric patient boarding times in the Emergency Department (ED).

Methods: We performed a retrospective multicenter cohort study of all patients assessed to require inpatient psychiatric hospitalization at two community EDs from July 1, 2010 through May 10, 2013. All patients requiring inpatient psychiatric hospitalization were included. Exclusion criteria consisted of patients under 18 years of age, patients over 65 years of age, patients who required medical stabilization prior to transfer, pregnant patients, and patients discharged from the ED prior to transfer to a psychiatric facility. A total of 1,122 patients qualified and time of arrival, time of disposition and time of transfer were collected. Using SPSS software, a two-sample t-test with correction for unequal variance analyzed boarding times before and after the psychiatric hospital closure on July 1, 2012.

Results: We found a statistically significant difference between the boarding time before and after closing (t=23.7, p<0.0001, df=676.9). The mean number of minutes before closing was 238.6 (sd=204.4) and 854.3 (sd=586.1) minutes after closing.

Conclusion: There was a greater than 3.5 times increase in mean boarding time for psychiatric patients following the closure of a public mental health hospital. This study highlights the significant impact that the closure of a single inpatient psychiatric facility can have on nearby emergency departments. We hope to bring 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.



Electrocardiogram Patterns as Predictors of Pulmonary Embolism

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Study Objective: Electronic medical records are a relatively new technology that allows emergency physicians to quickly review patients' previous medical records including previous electrocardiograms (EKGs). Multiple previous studies have looked at EKG patterns predictive of pulmonary embolism (PE) at time of PE diagnosis, though none have examined EKG changes in these patients when compared with their previous EKGs. The objective of this study is to identify the most common EKG changes in patients with known PE when their EKGs are compared with their previous.

Methods: The study was conducted at an urban community teaching hospital with an annual emergency department (ED) census of approximately 60,000. A retrospective chart review of all patients diagnosed with PE in the ED from 2008-2013 was performed. Only those patients with PE diagnosed by high probability ventilation-perfusion scan or by identification of a PE in the pulmonary artery bifurcation (saddle embolism), main or lobar arteries on computer tomography (CT) were included in the study. Each patient's presenting EKG was compared with their most recent EKG obtained prior to the diagnosis of PE. Patients with EKGs showing a paced rhythm were excluded from the study.

Results: There were 116 cases reviewed. The mean age was 62.9 years (Range: 23-96years) with 66% being female. The average duration of time from previous EKG to EKG at presentation was 14 months (Range: 1day - 48months). The most common change noted was sinus tachycardia (41%). 34% of patients had new T-wave inversions with the majority occurring in the inferior and lateral leads. 24% had new T-wave flattening, also most commonly in the inferior and lateral leads. New ST-depression was present in 9% of patients, with majority in the inferior and lateral leads. Two patients (1.7%) had new ST-depressions in the anterior leads consistent with a right heart strain pattern, six patients (5.2%) had a new S1Q3T3 pattern, four patients (3.4%) had a new right bundle branch block and seven (6%) had a new right axis deviation. 19% of patients had no change in their EKG.

Conclusions: The most common EKG change when compared to previous in the setting of PE is sinus tachycardia, present in approximately 40% of cases. New T-wave changes and ST-depressions are present in a minority of patients, with these changes most commonly occurring in the inferior and lateral leads. Only a small minority of patients with PE will have a new S1Q3T3 or right heart strain pattern. Approximately one-fifth of patients with PE will have no change in their EKG.



Creating a Novel Pharmacy Curriculum for Emergency Medicine Resident Physicians

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The Accreditation Council for Graduate Medical Education's emergency medicine (EM) milestones require EM residents be competent in pharmacology. The unique environment of the ED makes it errorprone, with 59% of ED patients affected by medication errors. Prior work demonstrated that emergency medicine pharmacists (EMPs) identify and prevent medication errors. This project is the first of its kind to use clinical data captured by EMPs to identify EM resident knowledge gaps in pharmacology. This project aims to develop a new EM pharmacology curriculum through use of a two-tiered needs assessment. The first tier surveyed EM residents on their self-reported comfort with appropriate use of common medications. The second tier involved prospective data collection of ED medication order corrections made by EMPs. The combined results of this data will inform the development of a novel EM pharmacology curriculum. EM residents in a PGY1-4 residency were surveyed anonymously to rate their comfort with use of common EM medications on a five-point Likert scale. EMPs recorded all interventions made to ED medication orders from September to November 2013 at a tertiary, academic medical center with 80K patients/year. The voluntary survey had an 88% response rate. Residents felt least confident in their knowledge of anticonvulsants, medication side effects, and anticoagulants (Table 1). EMPs recorded a total of 143 interventions during the study period. EMPs most commonly intervened on antibiotic (57%) and anticoagulant (14%) orders (Chart 1). Survey data was compared to EMP data for a more complete evaluation of EM residents' pharmacology education needs. EM residents' reported comfort with commonly used medication classes did not correlate with those requiring most frequent intervention by EMPs. To our knowledge this project is the first of its kind to utilize prospective clinical data to design a pharmacology curriculum.



US Guided Cannulation of Jugular Vein with Peripheral IV Catheter Patient with Vascular Access

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Background: Many patients in the emergency department present a challenge for the clinician seeking vascular access. Alternate methods of access have been proposed including central venous catheters, peripherally inserted central catheters, intraosseus lines, and ultrasound-guided peripheral IV placement. A novel technique of placing a long angiocath into the internal jugular vein under ultrasound guidance has been proposed (IVIJ). We sought to explore out institutional experience with this line in a retrospective fashion.

Methods: Retrospective review of emergency department patients at a tertiary care academic medical center who failed conventional means of IV access and received IVIJ.

Results: A total of 7 patients were identified during the study period in whom IVIJ was attempted by one of 2 operators. The patients ranged in age from 25 to 86, 57% (4/7) were female, 43% (3/7) were critically ill, all patients had significant comorbid conditions. IVIJ was successful in 86% of cases (6/7) with the one failure being due to clots in the internal jugular vein. No immediate complications were noted. All patients were subsequently admitted to the hospital.

Conclusions: IVIJ appears to be an effective method of achieving IV access in a small series of patients in whom more conventional means of IV access have failed. More study will need to be done to address complications and patient comfort.



Trends in Lactate Orders and Mortality from Sepsis since Implementation of iSTAT Lactates and Addition of Lactate to Blood Culture Panel

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Background: Sepsis is a systemic host response to infection that is associated with significant morbidity and mortality. The incidence of sepsis is increasing. Lactate is a prognostic and diagnostic indicator of severe sepsis. Surviving Sepsis Campaign guideline recommends routine screening of potentially infected patients in order to increase the early identification of sepsis and allow implementation of early goal-directed therapy. Reducing the time to diagnosis of severe sepsis is thought to be a critical component of reducing mortality from sepsis-related multiple organ dysfunction. Our institution's Sepsis Initiative began in January 2011. At this time, routine use of lactate screening for severe sepsis was not performed hospital-wide.

Hypothesis: Implementation of a quality improvement project that incorporates lactate into the blood culture order panel and iSTAT lactate point-of-care testing in the emergency department (ED) will increase utilization of lactate and early recognition of sepsis, which may potentially lead to decrease in mortality.

Methods: This was a retrospective quasi-experimental study of patients presenting to an urban, academic tertiary care center from July 2012 through May 2013. In December 2012, lactate was added to blood culture panel. The number of lactates drawn in the ED and intensive care units (ICUs: medical, surgical, cardiac and neurology/ neurosurgery) before and after the process change were recorded. Furthermore, in January 2013 the ED initiated the use of iSTAT lactate as a mechanism for point-of-care testing, and this was added to the total number of lactate orders for the ED. Other data collection included sepsis volume, mortality due to sepsis, and hospital length of stay. Additionally, united healthcare consortium mortality index, and mortality rate over time were calculated. Descriptive statistics where used to analyze the data.

Results: Over the study period, lactate utilization increased throughout the ICUs. From July 2012 to May 2013, MICU increased from 88 to 146, the SICU increased from 15 to 106, the cardiac ICU increased from 19 to 114, and the neuro ICU increased from 48 to 64 lactate levels per month. The ED increased from 167 lactate levels drawn in July 2012 to 424 levels drawn in May 2013, including 81 iSTAT lactates. During this time, incidence of sepsis increased from 68 cases to 86 cases per month, though mortality rate decreased from 30.9% to 14%, perhaps due to increased and earlier recognition of sepsis.

Conclusion: Utilization of lactate significantly increased after its inclusion into our blood culture panel. Point-of-care iSTAT lactate testing is an effective mechanism to obtain a rapid result. Further studies are needed to determine if there is a correlation between these process improvements and the reduction in mortality.



Correlation of Pre-Hospital Blood Pressure to Stroke Type

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Introduction: Stroke is one of the top five leading causes of death worldwide, and despite medical advancements, is also one of the leading causes of severe disability in the world. Distinguishing type of stroke is currently dependent on confirmation via neuroimaging, which can be timely even in the best-case scenarios. Blood pressure is generally elevated in the setting of acute stroke, and its correct management needs to be timely and appropriate to stroke subtype.

Study Objectives: The purpose of this study is to investigate the hypothesis that pre-hospital blood pressure will be significantly higher in the setting of acute intracerebral hemorrhage as compared to acute ischemic stroke.

Methods: Retrospective chart review study of patients transported by EMS to a community ED. Included are all adult patients who had final hospital diagnoses of ischemic or hemorrhagic stroke. Data collected included patient demographics, EMS vital signs, and ED management. Comparison between the ischemic and hemorrhagic patients were tested using Student t-test with significance set at .05.

Results: There were 99 EMS transported patients with final diagnose of TIA/CVA. The mean age was 74.6 years (SD: 15.2) with 44.4% (44/99) males. 82.8% (82/99) were ischemic stroke with 5% (5/99) being TIA. 18.2% (18/99) received TPA in the ED. 17.2% (17/99) had intracranial hemorrhage (ICH). The systolic blood pressure recorded by EMS was significantly higher in the ICH patients (180.5 versus 156.8; P=.011). However, there were no significant differences in the diastolic blood pressure (89.2 versus 81.5; P=.302).

Conclusion: In this small EMS study from a community Emergency Department, initial systolic blood pressures were significantly associated with the presence of intracranial hemorrhage.

Key Words: EMS, Blood Pressure, ICH, Ischemic Stroke



Emergency Physician Throughput: Impact of Hospital Wide Electronic Medical Records on Patients Seen Per Hour

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Introduction: In this study we address the change, if any, in patient throughput for attending physicians in an Emergency Department setting, after changing from a paper based system to an EMR (electronic medical records) system. Emergency Department physicians are often judged and even compensated on the number of patients they can see and dispositions provided, on an hourly basis safely. Emergency Department physicians are also often judged and compensated on patient satisfaction scores, which are often driven by time variables such as time to room, time to doctor and time to disposition. As EMR systems are implemented in Emergency Departments to save costs and provide more efficient and proficient patient care, the question arises; how does this affect the efficiency of the department and therefore affect the health care experience for the patient. This study will look at the hard numbers of patients per hour before and after implementation of a hospital wide electronic health record and ordering system.

Study Objectives: This study will measure the difference in attending physician patient per hour for 6 months before the installation of the EMR and 6 months after the install date.

Methods: This is a retrospective study of the numbers of patients seen by Emergency Physicians (EP) during six months from January, 2012 to July, 2012 and compare with the six months October, 2012 to April, 2013. During October of 2012, the Emergency Department (ED), along with the hospital transitioned to an Electronic Medical Record (EMR) system (EPIC[®]). The hospital in this study is a full service community hospital in a large urban setting. The ED has its own three-year Emergency Medicine Residency Program and in 2013, the ED volume was 38,000. Patients seen per hour (PPH) were calculated by the month and entered into individual control charts plotting patient/hour against the month. Upper and lower control limits were set based on plus or minus one standard deviation as calculated from the moving range.

Results: There were 19,467 patients seen in the six months pre EMR and 18,931 seen in the six months post EMR by14 EP in this study. For all EP, the mean PPH dropped from 2.32 to 2.22 but during all the post EMR months, patients seen per hour were within one standard deviation of each other. Separate control charts on the fourteen physicians show that for the most part EP individually stayed within one standard deviation for patient seen per hour following EMR implementation. Patient seen per hour increased linearly as ED volume increased (R-sq=92%; p<.001)

Conclusion: In this retrospective study of patients seen per hour from a single Emergency Department before and after implementation of EPIC EMR, moderate variability was seen on a monthly basis. There was no change in variability pre and post EMR. During the study period EM patient seen per hour linearly increased along with total patient volume.

Key Words: Electronic medical records, emergency department, patient seen per hour, control charts



Can You Identify High Risk Pulmonary Embolism Patients Based on EKG and Echocardiogram Results?

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Introduction: Pulmonary embolism (PE) is a common disease entity occurring in approximately 1 in 1000 people each year. Diagnosing patients with PE can be difficult as patients with PE often present with nonspecific signs and symptoms. As a cause of death, massive/saddle PE is second only to sudden cardiac death. Diagnostic study results such as EKG, echocardiography, and venous ultrasound results have not been shown to be consistent in patients with PE.

Study Objectives: To determine if there were common EKG, echocardiography, or venous duplex ultrasound findings suggestive of massive pulmonary emboli.

Methods: This is a 5-year retrospective medical record review from a community teaching hospital with its own Emergency Medicine residency program. Following IRB approval, all ED patients age \geq 18 admitted to the hospital with a new PE were reviewed. Excluded were cardiac arrest patients and those without CT confirmation of PE. Data collection included demographics, location and type of PE, ECG findings, echocardiogram results, and venous duplex ultrasound results. Comparisons between groups were made using Chi-squared ANOVA as appropriate. Significance was set at 0.05.

Results: There were 674 cases of PE reviewed over the five-year study period. 73 were not diagnosed by CT scan and thus excluded, leaving a study group of 601. The mean age was 68.6 years (SD:16.0) with 42.3% males. By location, 32.8% were unilateral sub-segmental, 37.8% bilateral sub-segmental, 15.3% unilateral mainstem, 9.1% bilateral mainstem, and 5.0% saddle. On EKG, the presence of S1Q3T3 increased from 4.1% for unilateral sub-segmental to 33.3% for saddle emboli (P<0.001). RBBB increased from 5.1% to 13.3% (P=0.006). 320 cases (53.2%) had an echocardiogram performed. RVH, diagnosed by echocardiogram, increased from 7.5% of unilateral sub-segmental to 41.7% for saddle emboli (P=0.001). DVT studies were performed on 510 (84.9%) patients.

Positive DVT studies increased from 30.7% in unilateral sub-segmental to 76.9% in saddle emboli (P<0.001).

Conclusion: Patients in our study group who were diagnosed with saddle pulmonary emboli were significantly associated with more S1Q3T3 and RBBB abnormalities on EKG, RVH on echocardiogram, and more likely to have the presence of a DVT detected on ultrasound. This suggests that we may be able to identify those high-risk PE patients more rapidly based on their EKG and echocardiogram results.

Key Words: Saddle pulmonary embolism, echocardiogram, RVH, EKG abnormalities



Use of Levetiracetam for Breakthrough Seizures in the Emergency Department

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Introduction: Patients with suspected seizure disorders presenting to the Emergency Department for breakthrough seizures is a common occurrence. In recent years, single dose Levetiracetam therapy has gained popularity for its role in seizure prophylaxis with regards to patients suffering from head trauma. Its use in prophylaxis for breakthrough seizures in the non-trauma population has not been studied to date.

Study Objectives: The purpose of this study is to gain insight into the popularity of Levetiracetam as a single dose agent for seizure prophylaxis in the Emergency Department.

Methods: Retrospective, electronic chart review of adult seizure patients from three community Emergency Departments (ED) for six months from June 1, 2013 to November 30, 2013. Charts were reviewed on patients ≥ 18 presenting to the ED with a chief complaint of seizure and discharged with a diagnosis of seizures. Excluded were patient with status epilepticus, major head trauma, complications of alcohol abuse, or other identifiable cause to the seizure (e. g. hypoglycemia, hyponatremia, tumors, or eclampsia). In patients with multiple ED visits for seizures, only the initial visit was included. Abstracted were age, gender, chief complaint, prior history of seizures, current AED (anti-epileptic drug), any AED given in the ED, and any prescriptions for AED upon discharge from the ED. Descriptive statistics were calculated and given as percentages with 95% confidence interval (CI).

Results: Meeting inclusion and exclusion criteria were 212 patients with mean age of 41.0 years (SD: 15.4) and 58.5% male (124/212). A past history of seizures was recorded on 92.5% (196/212) of the patients but only 75.5% (160/212) claimed to be taking AED (anti-epileptic drugs). A single AED were used by 68.1% (109/160) of the patients while 31.9% (51/160) were on multiple drugs. The most common AED used overall at home was Levetiracetam at 31.9% (95% CI: 25.1%, 39.5%), followed by Phenytoin at 30.6% (95% CI: 24.0%, 38.2%), and Carbamazepine at 16.9% (95% CI: 11.8%, 23.5%). In the ED, an AED was given to 118 patients (55.7%). Levetiracetam was the most common single AED given in the ED at 35.5% (95% CI: 26.5%, 45.6%) followed by Phenytoin at 24.7% (95% CI: 17.0%, 34.4%) and Lorazepam at 17.2% (95% CI: 10.8%, 26.2%)

When a single agent prophylaxis was given in the ED, Levetiracetam was given to 14 of 21 patients not previously on prior AED (66.7%, 95% CI; 45.2%, 82.9%). Upon discharge from the ED, prescriptions were written for 29 refills and 29 (13.7%) new AED. Levetiracetam was prescribed as a new AED in 69.0% (95% CI: 50.6%, 82.9%) of the cases, including 55.2% (95% CI: 37.5%, 71.6%) of patients on no previous AED.



Conclusion: In this study from three community hospitals, Levetiracetam was the most common antiepileptic drug used as a single agent prophylaxis in the Emergency Department. Levetiracetam was given in the ED to 66.7% of patients not previously on prior AED and upon discharge to 69.0% of patients given a prescription for a new AED.

Key Words: Levetiracetam, Seizure prophylaxis, Emergency Department, Retrospective Study



CT Scans in Pediatric Head Trauma: Correlation with Emergency Department Length of Stay

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Introduction: It is estimated that there are approximately 500,000 to 600,00 pediatric visits to the emergency department annually are for blunt head injury. There have been multiple research articles regarding the work up of blunt head injury with mild traumatic brain injury (TBI), most often discussing the utility of head CT. This was specifically addressed in the PECARN article, where researchers looked at thousands of pediatric patients and developed an algorithm for the work up.

Study Objectives: The goal of this investigation was to look at patients who did not require CT imaging after blunt head injury, and to compare the length of stay (LOS) in the emergency department of patients who received CT imaging versus those who did not.

Methods: This is a retrospective EMR (electronic medical record) review of pediatric patients presenting to the ED (Emergency Department) of three urban/suburban community hospitals with head injuries. Included are patients between 2-18 years old and excluded were cases of alcohol intoxication, victims of motor vehicle collisions, and assault victims. Following IRB approval, data was extracted including age, gender, detailed history, detailed physical findings, CT scan results, and ED LOS. Presence of PECARN criteria (severe headache, severe mechanism of injury, altered mental status, loss of consciousness, emesis, GCS<14, and basal skull signs) were abstracted for each patient. The data was stratified by PECARN criteria and CT scan and tested using Student-t, Chi Square, or Fisher test as appropriate. Significance was set with an alpha of 0.05 (two-tailed). Statistical calculations were performed using SPSS 22.0 (IBM, Inc., Chicago, Illinois, 2012).

Results: Between June 1, 2013 and December 31, 2013, 13,118 pediatric patients 18 years and under were evaluated in the three ED. There were 323 (2.5%) head injuries and 271 patients (2.1%) met inclusion/exclusion criteria. The mean age was 7.5 years (SD: 4.6) with 68.6% male. At least one of the PECARN criteria was met by 21.4% (58/271) had while 78.6% (213/271) had no PECARN criteria. Patients without PECARN criteria did not have CT scans in 98.1% of cases while patients with PECARN criteria were not scanned in 44.8% (p<.001) Overall 36 CT scans were done (13.3%). There were five positive CT scans, all in PECARN positive patients (8.6%): three subdural hematoma, one epidural hematoma, and one sinus fracture with pneumocephalus. PECARN negative patients without CT scans had mean length of stay (LOS) of 94.1 minutes versus an increase to 170.2 minutes for the four PECARN negative patients who did have CT done (Diff: 77.9, 95% CI: 35.1, 120.8, p<.001) Excluding the patients whose CT scan were positive, CT scanning in PECARN positive patients also increased ED LOS by 73.4 minutes (95% CI: 30.0, 116.9, p=.001 Of the 58 PECARN positive patients, 38 (14.0%) patients had one criteria, 11 (4.1%) had two criteria and 9



(3.3%) had three criteria. The most frequent criteria reported was severe headache (8.9%) followed by severe mechanism of injury (5.9%), altered mental status (5.5%), loss of consciousness (4.8%), emesis (3.7%), GCS<14 (2.6%), and basal skull signs (0.7%) Of the five positive CT scans, one patient had only one PECARN criteria while four patients had two criteria.

Conclusion: In this retrospective study of pediatric head injury from three community Emergency Departments, 21.4% had at least one PECARN criteria. Patients without any PECARN criteria were not scanned 98.1% of the time. Patients without any PECARN criteria were scanned 1.9% of the time. These patients had an increased LOS by 77.9 minutes. Positive CT scans were found in 8.6% of PECARN positive patients and none of the PECARN negative patients.

Key Words: PECARN, pediatric head injury, Emergency Department, Retrospective study



Sterile Pyuria in Acute Appendicitis and Diverticulitis

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Introduction: During Emergency Department (ED) evaluation of abdominal pain, pyuria is often found, and attributed to a urinary tract infection. However, the finding of pyuria may lead to a rudimentary diagnosis of urinary tract infection and delay proper diagnosis and treatment of another cause of abdominal pain.

Study Objectives: Find the incidence of sterile pyuria in acute appendicitis and diverticulitis.

Methods: Retrospective electronic medical record review of patients presenting to the ED of three urban/suburban community hospitals over a 12 month period. Included were patients with a final diagnosis of appendicitis or diverticulitis. Excluded were patients without computed tomography scans or operative report to confirm diagnosis, and patients without urine analysis (UA). Data extracted included age, gender, final diagnosis, UA results, and culture results. Pyuria was defined as >10 WBC/HPF. The data was stratified and tested using Student-t, ANOVA, Chi Square, or Fisher test as appropriate. A sample size of 140 was found to give 80% power to find at least a 25 % difference between groups.

Results: Reviewed were 481 cases diagnosed with appendicitis or diverticulitis. Excluded were 43 cases without documentation diagnosis and 71 cases without UA, leaving 202 cases of appendicitis and 165 cases of diverticulitis. Urine cultures were sent in 34.2% of appendicitis and 42.4% of diverticulitis. The pyuria rate was 8.4% in appendicitis and 9.1% in diverticulitis.

The sterile pyuria rate in acute appendicitis was 87.5% while the sterile pyuria rate in acute diverticulitis was 72.7%. In both appendicitis and diverticulitis, pyuria was significantly more common in females (P<.001). In acute appendicitis, pyuria was also more likely in the older patients (P=.003). Of the eight cases of pyuria with a positive urine culture (four in each diagnosis), five were E. Coli.

Conclusion: Sterile pyuria is common in both acute appendicitis and acute diverticulitis. Suspicion of a severe intra-abdominal infection should remain strong even when pyuria is detected.

Key Words: Appendicitis, Diverticulitis, Pyuria, Urine Culture



False Positives Outcomes with SIRS Screening in a Community Emergency Department

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Introduction: Hospital mortality from sepsis has ranged from 25% to 80% over the last few decades and diagnosis in the ED (Emergency Department) has recently been supported by screening tools using SIRS criteria. Prior studies have suggested that the specificity of SIRS for a final diagnosis of sepsis to be as low as 35% (for a false positive rate of 65%).

Study Objectives: Our study aims to determine the specificity and false positive rate for a suspected population and review the ED admitting diagnosis to see if the high false positive arte may be improved upon.

Methods: As part of an institutional sepsis initiative, SIRS screening was performed on all patients > 18 admitted to the hospital with suspicion of having positive SIRS. The SIRS criteria includes: Temperature > 38°C or < 36°C; HR > 90; RR >20 or PaCO2<32; WBC < 4,000 or > 12,000; Bands>10%. Two or more positive criteria define a positive screen. This is a retrospective review of the patients screened. Excluded are patients who expired in the ED, patients who had withdrawal of care during hospitalization, patients with missing results. Using the final discharge DRG diagnosis as the "gold standard", sensitivity, specificity, false positive rate, and false negative rate for sepsis will be determined. Emergency Department evaluation and admitting diagnoses will be stratified to investigate improvement in the false positive rate.

Results: There were 258 cases receiving SIRS screening in the ED and admitted to the hospital during a 12 month period 2010-2011. 214 (82.9%) were 65 or older with mean age of 76.3 (SD: 14.5) and 48.1% (124/258) males. 88.4% (228/258) had 2 or more SIRS criteria 65.9% (170) cases had a suspected infectious source on ED admission. Only 39.9% (103) cases had a final discharge diagnosis of sepsis giving sensitivity of 92.2%, specificity of 14.2%, false negative rate of 7.8%, and false positive rate of 85.8%. Patients >65 had false positive rate of 85.8% versus 85.7% for patient <65. Patients admitted with suspected infections had false positive rate of 85.9%, respiratory distress 80.0%, patients with acute renal disease had false positive rate of 66.7%.

Conclusion: Using the current criteria for SIRS screening for suspected sepsis in a community ED, the sensitivity is high but the false positive rate is also high. Stratifying the patients based on ED evaluation and initial impression does not alter the high false positive rate with SIRS screening.

Key Words: SIRS screening, Sensitivity, Specificity, Admit diagnosis, Sepsis



Patterns of Mobile Technology Use in an Urban Emergency Department and Implications for Health Education

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Background: Low rates of Internet access, referred to as the "digital divide", may play an important role in determining health outcomes among the urban poor. Recent population surveys suggest accelerating rates of mobile smartphone adoption across broad demographic bands and associations between smartphone ownership and health information gathering behaviors. However, these general population trends have not been validated in the specific demographic of patients who utilize urban emergency departments.

Objectives: To assess Internet access, use patterns, and preferences for mobile technologybased health education and communication interventions among an emergency department (ED) population.

Methods: A cross-sectional convenience sample of adult ED patients and caretakers in the waiting room of an urban, quaternary-care, emergency department was studied via a verbally administered, 50-question survey of internet access and health-related usage.

Results: Of the 110 respondents, 58% were women, 55% over the age of 35, and 42% reported annual household income less than \$25,000. By insurance status, 53% were publicly insured, 34% private, and 13% uninsured. Overall rates of Internet access were 87% of which 51% cite cell phones as their primary access point. Of patients who use the Internet, 65% access the Internet several times each day. 92% of Internet users gather health information online. Of patients with cell phones, 20% report using apps to track or manage their health. Regarding health communication channel preferences, the majority of patients prefer phone call or inperson communication with their physician to videoconference or asynchronous communication channels such as email.

Internet websites or text messaging were identified as acceptable communication channels by 65% of respondents. Regarding barriers to mobile health adoption, concern related to confidentiality of electronic health information was noted in 57% of respondents, though 56% prefer reading about health information in an electronic rather than paper format.

Conclusion: The majority of urban ED patients report access to the Internet. The smartphone plays an important role in connecting patients to the Internet and in the gathering of health information. Our results suggest that the smartphone may be a viable platform for education and communication interventions in this patient population.



Pediatric Injury and Obesity Weight Prevalence Patterns in the Emergency Department

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Objectives: The purpose of the study is to determine whether pediatric obesity risk factors are translated to increased injuries of specific types, and to identify changes in proportions of obese and overweight children presenting to the emergency department.

Methods: The study is an IRB approved retrospective review of medical records to examine weights and injuries in children ages 2 to 16 years presenting to the Emergency Department in 2008 and 2013. The data collected determines the Weight Classifications and the Injury Classifications of each individual for analysis within the study. The patients in the study are split into four categories: Underweight, Average, Overweight, and Obese. The patients are further grouped into injury classifications: Head, Upper Extremity, Lower Extremity, Trunk, and Unknown.

Results: The results of this study show no significant changes in weight patterns from 2005 to 2013. Minor changes include an increase in overweight patients, a decrease in average greater than 50th percentile patients, and a decrease of obese patients. The overall injury pattern regardless of gender, weight, or year is: lower extremity, upper extremity, and head, with trunk and unknown injuries at a minimum.

Conclusions: The study will aid in providing education on healthy habits, weight reduction, and injury prevention to parents and children to avoid common injuries and promote a healthier lifestyle and allow physicians to effectively diagnose and treat pediatric patients.

Keywords: Pediatric, Obesity, Trauma, Injury, Weight



Gap Analysis of an Emergency Medicine Privilege List to Guide Future Faculty Development

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Emergency Medicine (EM) physicians are consistently called upon to perform numerous procedures, often emergently. Privilege lists define the scope of procedures that EM physicians are permitted to perform. However, these lists often vary among institutions and often contain procedures that EM physicians have not performed in years. The purpose of this study is to determine the confidence of, and frequency with which EM physicians perform procedures on their privilege list in an attempt to determine where to focus future educational efforts. Of the 40 total EM physicians surveyed at this tertiary care hospital, 29 (72.5%) of them responded to an anonymous online survey indicating their level of confidence ("Very Confident," "Neutral, Borderline Confidence," or "Not Confident") when performing procedures on their EM privilege list. They were also asked how frequently they performed each procedure on a patient as well as via simulation in the past two years. Through response analysis, we identified numerous procedures that a significant percentage of physicians were not confident in performing as well as numerous procedures that physicians had not performed in the past two years. Ten procedures were identified that more than 20% of the physicians were "not confident" performing and over 50% had not performed in the past two years. Of these procedures, three were identified as emergent and life-saving: cricothyrotomy, percutaneous trans-tracheal ventilation and pericardiocentesis. With quality improvement in mind, future educational opportunities and simulations will be designed to review these targeted skill sets identified as deficits from the gap analysis. Additionally, since we are able to focus our efforts on specific areas of improvement, we can pre-test to establish a baseline, post-test to establish mastery, and re-test to assess retention.



Subarachnoid Hemorrhage in the ED: A Systematic Review and Meta-Analysis of Diagnostic Accuracy in History, Physical Exam Findings, and Testing

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Background: Acute subarachnoid hemorrhage (SAH) is a rare, but serious etiology of atraumatic headache (HA) in emergency department (ED) patients.

Objectives: To conduct a systematic review and meta-analysis of history, physical exam, imaging studies, and lumbar puncture (LP) results for adult ED patients presenting with acute, atraumatic HA suspicious for SAH.

Methods: We conducted a systematic review/meta-analysis of studies reporting data on ED HA patients with suspected SAH where 2x2 tables could be constructed. We searched 1966 -- 2012 in PUBMED, EMBASE, SCOPUS and additional studies were searched in research abstracts from five EM and neurology journals. QUADAS-2 was used to assess study quality and bias. When \geq 2 similar studies were identified, meta-analysis was conducted using Meta-DiSc. Outcomes were summary sensitivity, specificity, and positive and negative likelihood ratios (LR+ and LR-).

Results: In 3,274 citations, 126 underwent full text-review; 16 studies were included. Across studies, SAH definitions were highly variable, specifically how positive LP was defined. Clinical follow-up and success rates varied considerably. In QUADAS-2, study quality was variable; however, most had a relatively low-risk of biases.

See Meta-Analysis of Diagnostic Accuracy (next page).

Conclusion: Non-contrast head CT is highly sensitive for SAH and has perfect specificity. Certain history and physical exam findings are more suggestive including unconsciousness, AMS, focal neuro deficits, nuchal rigidity, blurred vision, and exertion at onset; however none are sufficiently specific to rule out SAH.



Meta-Analysis of Diagnostic Accuracy

Test/Finding	# Studies	Sensitivity (95% CI)	Specificity (95% CI)	LR+ (95% CI)	LR- (95% CI)
Non-contrast CT	4	0.94 (0.91 - 0.96)	1.00 (1.00-1.00)	8	0.08 (0.03- 0.23)
LP Xanthochromia	4	0.74 (0.57 - 0.88)	0.81 (0.79-0.84)	<mark>6.64 (1.63-</mark> <mark>27.06)</mark>	0.36 (0.16- 0.83)
Nausea	5	0.60 (0.52 - 0.68)	0.55 (0.51-0.59)	1.22 (0.91-1.64)	0.85 (0.48- 1.51)
Vomiting	2	0.61 (0.53- 0.68)	0.73 (0.71-0.75)	1.64 (0.89-3.04)	0.58 (0.48- 0.71)
Photophobia	4	0.16 (0.10- 0.24)	0.79 (0.75 to 0.82)	1.08 (0.52-2.24)	1.03 (0.91- 1.16)
Stiff Neck	4	0.66 (0.58- 0.73)	0.70 (0.68-0.72)	2.55 (1.54-4.22)	0.54 (0.36- 0.80)
Blurred Vision	2	0.11 (0.02- 0.28)	0.96 (0.93 to 0.98)	<mark>3.65 (0.24-</mark> <mark>54.75)</mark>	0.84 (0.42- 1.66)
Exertion at Onset	2	0.30 (0.23- 0.37)	0.89 (0.87-0.90)	2.03 (1.53-2.68)	0.83 (0.70- 0.98)
Exploding	2	0.29 (0.19- 0.42)	0.66 (0.58-0.73)	1.28 (0.89-1.83)	0.92 (0.67- 1.25)
Onset Instantaneous	2	0.63 (0.53- 0.72)	0.44 (0.40-0.49)	1.12 (0.81-1.54)	0.86 (0.52- 1.42)
Onset 2-60 seconds	2	0.23 (0.16- 0.32)	0.73 (0.68-0.77)	1.08 (0.47-2.47)	1.00 (0.78- 1.24)
Onset 1-5 minutes	2	0.07 (0.03- 0.13)	0.86 (0.82-0.89)	0.26 (0.01-6.26)	1.13 (1.08- 1.18)
Male	2	0.44 (0.33- 0.55)	0.29 (0.19-0.40)	0.89 (0.62-1.27)	1.23 (0.71- 2.13)
Female	3	0.57 (0.50- 0.63)	0.41 (0.39-0.43)	1.03 (0.83-1.26)	1.00 (0.82- 1.22)
Nuchal Rigidity	2	0.30 (0.22- 0.38)	0.94 (0.93 0.95)	2.53 (0.24- 26.68)	0.88 (0.58- 1.32)
Focal Neuro Deficit	3	0.37 (0.25- 0.50)	0.91 (0.86-0.94)	<mark>3.13 (1.63-6.02)</mark>	0.75 (0.61- 0.94)
Altered Mental Status (AMS)	4	0.25 (0.16- 0.35)	0.91 (0.87-0.94)	2.22 (1.35-3.65)	0.87 (0.78- 0.98)
Unconscious	2	0.17 (0.11-0.24)	0.96 (0.95-0.96)	<mark>3.78 (2.51-5.71)</mark>	0.87 (0.81- 0.93)



Online Curriculum: Fourth-Year Student Preferences vs. Reality

Edward K. Lew, MD*; Erik K. Nordquist, MD; John H. Stroger Jr. Hospital of Cook County Chicago, IL

Background: Online curricula are gaining momentum in medical education. In our busy urban emergency department, there is limited faculty time to give monthly in-person traditional lectures to fourth-year medical students (M4s). Some have proposed moving the core curriculum online. M4 preference and acceptance of an online curriculum was unknown.

Study Objectives: We sought to assess interest and participation in an online curriculum among rotating M4s.

Methods: We developed 5 online voiced-over PowerPoint presentations. At orientation, students were provided access to this online curriculum as an additional learning modality to which they could review at their leisure. At the end of the 4-week rotation, we surveyed the subjects.

Results: 12 months of data from 108 students were collected and reported using descriptive statistics. A majority of students indicated a preference for inclusion of online teaching. 75 of 108 (69%) preferred either online only or a mixture of live and recorded lectures. However, only 46 of 108 (43%) reported viewing a majority of the lectures (3 or more lectures). Of the 75 who preferred mix or online, 35 (47%) watched less than 3. Furthermore, 27 (36%) watched zero or one lecture.

Conclusions: We found that despite medical student expressed preference for an online curriculum, they used the online resource at a low level. Given that student usage of the online curriculum was so low in our institution, it gives us pause to convert more core EM topics to an online format without additional monitoring or requirements.





A Novel Online Curriculum for Fourth-Year Medical Students

Edward K. Lew, MD*; Erik K. Nordquist, MD; John H. Stroger Jr. Hospital of Cook County, Chicago, IL

Background: Online curricula are gaining momentum in medical education. In our busy emergency department, there is limited faculty time to give monthly in-person traditional lectures to fourth-year medical students. Generally, faculty focus on topics seen with high frequency, leaving other subjects not formally taught. A novel online curriculum was developed to not only target this potential gap in the fourth-year curriculum, but also to evaluate this method of learning.

Study Objectives: We sought to evaluate if fourth-year medical students are able to retain knowledge from a novel online curriculum.

Methods: We developed 5 online voiced-over PowerPoint presentations. On the first day of the rotation, we pretested them with questions derived from these lectures. We then provided access to this online curriculum as an additional learning modality to which the students could review at their leisure. At the end of the 4-week rotation, we post-tested and surveyed the subjects. In accordance to the ethics of education, we had to provide this opportunity to all students at the same time; thus, students who did not watch served as the comparison group to those who did.

Results: 12 months of data from 108 students were collected and reported using descriptive statistics. 46 students reported watching 3 or more lectures. This group improved an average of 4.2 points (17%) on the post-test. The other 62 students reported watching less than 3 lectures. They improved 1.7 points (6.6%) on the post-test. Those who reported EM as their desired specialty and viewed 3 or more lectures (27 subjects) improved an average of 15% as compared to their EM bound counterparts that watched less than 3 (38) improving 8.6%. Students who did not rank EM as the top choice and watched at least 3 lectures (19) and those who did not watch (24) improved 19% and 3.7% respectively.

Conclusions: This data bolsters the idea that as a learning tool, students can retain information, at least in the short term, from online-recorded lectures. It seems, however, that non-EM bound students may have received the most benefit from the online lectures.



Trends in Age of Patients Presenting with Traumatic Brain Injury

Rachel Burt, MD*; Ellen Omi, MD; Yalaunda Thomas, MD; Erik Kulstad, MD; Advocate Christ Medical Center, Oak Lawn, IL

Background: Traumatic brain injury (TBI) is a major cause of death and disability, with over 290k hospital admissions, 51k deaths, and 80k permanent neurologic disabilities occurring annually in the US alone. With substantial data on TBI coming from large public datasets recently shown to have substantial weaknesses, analysis of trends and outcomes in reliable databases would be helpful to better understand areas in need of further study.

Objectives: We sought to examine a large, high-quality trauma registry to determine changes in ages of patients presenting with TBI and the influence of age on outcome, hypothesizing an increase in age of TBI patients over the study period.

Methods: We analyzed data from the Illinois Department of Public Health (IDPH) Trauma Registry (a large database maintained by professionals with experience in medical chart abstraction and data entry), retrieving data on patients treated for TBI at our large, tertiary care hospital during the years 2004 to 2012, inclusive. Basic demographics, such as age and gender, and clinical outcome, were analyzed and compared over the years with logistic regression models.

Results: A total of 3039 patients with TBI were treated over the study period, with a mean age of 43 years (SD 24) and a median age of 41 (IQR 23 to 60). Age increased steadily throughout the study period, from 32 years in the earliest to almost 49 in the latest (Table 1). Overall mortality was 21%, with patient mortality decreasing over the entire period (OR 0.88, 95% CI 0.85 to 0.91).

Conclusion: Although the age of patients presenting with TBI is increasing substantially, these data suggest that unexpectedly, overall mortality appears to be decreasing.



Temporal Trends in the Influence of Gender on Outcomes of Traumatic Brain Injury

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Background: Traumatic brain injury (TBI) is a major cause of death and disability, with over 290k hospital admissions, 51k deaths, and 80k permanent neurologic disabilities occurring annually in the US alone. Studies examining the influence of gender on outcome after TBI have shown conflicting results, as have the changes in outcome over the last decade; however, some of the uncertainty may be due to weaknesses recently identified in popular large public datasets.

Objectives: We sought to examine a large, high-quality trauma registry to measure mortality after TBI, comparing outcomes between genders since the origination of this database, hypothesizing equivalently decreased mortality for both genders over the study period.

Methods: We analyzed data from the Illinois Department of Public Health (IDPH) Trauma Registry (a large database maintained by professionals with experience in medical chart abstraction and data entry), retrieving data on patients treated for TBI at our large, tertiary care hospital during the years 2004 to 2012, inclusive. Basic demographics, such as age and gender, and clinical outcome, were analyzed and compared over the years with logistic regression models.

Results: A total of 3039 patients with TBI were treated over the study period, of which 25% were female. The percentage of female TBI patients increased throughout the study period, from 16.4% initially, to 27.5% over the last 4 years. Overall mortality was greater for males than females (22.1% versus 17.3%, OR 1.36, 95% CI 1.10 to 1.68). Patient mortality decreased over the entire period (OR 0.88, 95% CI 0.85 to 0.91) overall, with a greater decrease seen in females (OR 0.84, 95% CI 0.78 to 0.90) than in males (OR 0.90, 95% CI 0.86 to 0.94).

Conclusion: These results suggest that gender influences outcome in TBI, with males having a higher mortality rate, but with decreasing mortality over the 9 year analysis, and with females unexpectedly having greater improvement in mortality than males while also representing a greater proportion of TBI patients.



Improving ER Wellness

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Background: Studies demonstrate that stress in the ED can increase physical and mental fatigue postshift. These factors provide a negative impact in the physician's quality of life. Scant data exists to support any reliable solution that can decrease shift stress. We propose that adding 10-minute breaks during a shift will improve stress and mental and physical fatigue.

Objective: The aim of this study was to study the impact of short breaks on resident fatigue and stress levels.

Method: We used a 3-month prospective cohort in a 3-year residency program. Residents were encouraged to complete a post-shift survey that included the Maslach Burnout Inventory to assess stress across 3 categories and the Swedish Occupational Fatigue Inventory to assess mental and physical fatigue across 5 categories.

Surveys from residents working shifts without breaks were compared against residents working comparable shifts that were encouraged to take a 10-minute break. An equal amount of shifts were designated as "break" and "non-break."

Results: Over a 3-month period 103 resident surveys (20 "break" and 83 "non-break") were completed. Across all classes, no significant difference in stress or mental and physical fatigue was found between "break" shifts and "non-break" shifts. Compared to interns, senior residents consistently displayed significantly more stress in none break groups in the categories of emotional exhaustion (EM2 p=<.001, EM3 p=.003) and depersonalization (EM2 p=.003, EM3 p=.002)

Conclusion: Despite encouragement and support to take breaks, we found that residents were resistant to leaving the ED; including senior residents who exhibited increased mental fatigue and stress. This senior resident mentality may stem from a strong responsibility to the ED patients. Further, the role modeling exhibited from senior residents can encourage similar behavior in junior residents. Additionally, when residents did take breaks we found no significant difference in level of stress and fatigue. Perhaps, these breaks were not long enough to improve these factors. However, small sample sizes makes final conclusions difficult. We will continue this study for the duration of the academic year to account for sample size variances.



	EM1 vs EM2	EM1 vs EM3	EM2 vs EM3
Personal	t-1.421	t309	t851
Accomplishment	p1602	p0694	p399
Emotional	t-4.61	t-3.09	t-1.225
Exhaustion	p0001	p003	p226
Depersonalization	t-3.058	t-3.198	t7816
	p003	p002	p4377



Palliative Medicine Physician Stationed in the Emergency Department: A Novel Approach

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Inpatient Palliative Medicine (PM) specialists reach patients late in their hospitalizations (Teno 2013).

We were interested moving basic discussions regarding advance directives and goals of care "upstream" to the Emergency Department (ED). We cataloged the experiences of a Hospice and Palliative Medicine fellow (HPMF) specifically stationed within in a high-volume, academic Emergency Department (ED) for a two-week period.

Methods: One of the authors, an HPMF, was physically present in the hospital's ED for approximately fifty hours over a two-week period as part of fellowship training. The average number of patient encounters in the ED during this time was 225 per day.

Consistent with the ED's prior practice, requests for PM consultation were based on the Attending Emergency Physician's (EP) clinical impressions. Residents, nurses and social workers were encouraged to suggest consultation to the EP when they felt it was appropriate.

Consultation outcomes were discussed with the EP, documented in the medical record and discussed with the inpatient PM attending physician in routine fashion. If the patient was admitted, continuation of inpatient Palliative consultation services was jointly at the discretion of the admitting service and the PM inpatient team. Data on patients' advance directives and disposition were tracked.

Results: Twenty-five palliative consultations were requested in the ED over a two-week period. Prior to this the baseline number of consultations to PM from the ED averaged one per month.

Sixteen (64%) patients were transitioned from the ED with newly documented advance directives beyond those detected by the hospital's registration-based screening protocol in accordance with the Patient Self Determination Act.

Four inpatient admissions were avoided (16%). These included two home hospice admissions from the ED (8%), control of one acute-on-chronic pain crisis in a cancer patient resulting in discharge to home (4%) and one full admission converted to observation status (4%) after the patient's goals were clarified.



One patient self-identified as "Do-Not-Resuscitate" at initial presentation to the ED and later reversed his status to "Full Code" during inpatient hospitalization.

No transitions from the ED to an inpatient bed were delayed. Consultation was ongoing in one patient at the time of transport to an inpatient bed. Conversations were immediately stopped. This was included in the total number of consultations reported.

Comment: The number of inpatient PM teams is increasing (Morrison 2005), but patients aren't encountering these teams until late in their disease state and hospital course (Teno 2013).

In our experience, a PM provider stationed directly in the ED impacted patient's dispositions, and therefore, their hospitalizations. Moving inquiries about advance directives and goals of care to ED patients bypassed potential hospitalizations and positioned care planning as routine.

ED utilization of PM consultation increased and several admissions were avoided during this time. Although not specifically measured, ED throughput was respected.

The American College of Emergency Physicians recently prioritized engaging palliative and hospice services from the ED as one of its "Choosing Wisely" campaign recommendations (October 14, 2013). This reinforced PM as an integral function within our nation's EDs. Many thoughtful PM delivery models for the ED are being initiated nationally.

Additionally, a growing cohort of PM-trained EPs (PMEP) is emerging through fellowship training are arguably qualified to leverage ED-based consultation and impact high-risk and fragile patients when they present to the hospital (Quest 2008, Lamba 2012).

It remains to be seen if the pillars of PM, whole patient assessment, aggressive symptom management and advance care planning, lead to improvements in clinical quality, resource utilization and patient satisfaction when initiated from the ED.

Further inquiry and discussion of these topics is warranted.



Reasons for Emergency Department Use by Geriatric Patients

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Background: Older adults are a growing segment of the US population and are more likely to use the ED than younger adults. As geriatric ED visits increase, specialized geriatric protocols are being developed and dedicated geriatric EDs are being built. Understanding the reasons for ED use in this population is important to ensure that these efforts are accommodating their needs.

Objectives: To describe and compare reasons for using the ED among geriatric and non-geriatric patients.

Methods: A prospective, cross-sectional study of ED patients using a research assistants administered survey. Patients rated 21 statements about reasons for their ED use on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree). Patients >= age 65 were matched by triage score to non-geriatric patients at a ratio of 1:2. Based on a prior study, the survey statements were categorized into 5 factors of reasons for ED use: medical necessity, ED convenience, ED preference, limitations of insurance, and ED affordability. The total score for each factor was calculated, and the factor scores for geriatric and non-geriatric patients were compared using the Wilcoxon-Mann-Whitney test. The scores were then divided by the number of questions for each factor for easier reporting.

Results: 250 patients were approached for participation and 172 have participated: 58 geriatric and 114 non-geriatric. For geriatric patients the median score and interquartile range (IQR) for each domain were: ED preference: 4.0 (3.0-4.8), medical necessity: 3.5 (3.0-4.2), convenience: 3.2 (2.6-3.8), limitations of insurance: 1.3 (1.0-2.0), and affordability: 1.0 (1.0-1.5). For non-geriatric adults the median scores were: medical necessity: 3.5 (2.8-4.3), ED preference 3.5 (2.8-4.3), convenience: 3.1 (2.6-3.6), limitations of insurance 1.67 (1.0-2.0), affordability 1.5 (1.0-2.0). Geriatric patients were more likely to rate ED preference higher (p=0.035), and affordability lower (p=0.048) compared to younger patients.

Conclusion: Geriatric patients and younger adults have similar reasons for using the ED. However, geriatric patients rate preference for ED care higher and affordability lower than younger patients. Further research should evaluate the specific aspects of ED care that patients prefer to continue to improve acute care for geriatric patients in both the ED and outpatient settings.



Emergency Medicine "Resident as Teacher" Course: Did It Work?

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Background: Emergency medicine residents encounter the challenge of teaching medical students in a busy clinical setting. Utilizing conference time for "Resident as Teacher" presentations is one method that can be used to prepare EM residents to teach. The actual benefit of these sessions at our institution, however, was unknown

Objectives: We sought to assess the efficacy of a "Resident as Teacher" course in changing EM residents' behavior.

Methods: EM residents completed an anonymous survey reporting their teaching habits before attending a 4-hour lecture series devoted to the development of residents as teachers. Lecture topics included teaching clinical reasoning, bedside teaching, giving feedback, and evaluation. Immediately after the conference, attendees evaluated the quality of the lectures using a 5-point Likert scale. Three months after the conference, the residents were again surveyed to assess their teaching habits. Time spent teaching medical students per shift was reported in minutes. Frequency of teaching at the bedside and giving feedback was reported using a 5-point Likert scale (1 = Never, 3 = Sometimes, 5 = Very Often).

Results: 24 residents completed both surveys and were present for all 4 hours of the lecture series. On average, the course was highly rated (4.6 of 5.0) by attendees. Total time spent teaching medical students was unchanged 3 months following the teaching sessions. Before the intervention residents reported spending 23 minutes (95% CI 16.0-30.3) teaching during a shift vs. 21 minutes (95% CI 13.7-28.6) after attending the lecture series. Frequency of teaching at the bedside and giving feedback was also unchanged—2.8 (95% CI 2.4-3.1) vs. 3.0 (95% CI 2.6-3.4) and 3.2 (95% CI 2.7-3.7) vs. 3.1 (95% CI 2.8-3.4), respectively.

Conclusions: Though the "Resident as Teacher" course was highly rated by residents, no change in the residents' behavior was detected. The "Resident as Teacher" course will be redesigned in the future to more effectively impact the residents.



Impact of an Enhanced Medical Screening Exam on Emergency Department Operations: Simulation Modeling Approach

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Background: In the past decade, there has been more than a 30 percent increase in emergency department (ED) visits across the nation, which has led to ED overcrowding. There is a significant need to decrease ED overcrowding in order to improve patient outcomes, decrease healthcare spending, and to decrease ED wait times. Existing strategies to reduce ED overcrowding have failed to encompass all aspects of the system and have been proven unsuccessful. The purpose of this study is to create and validate the impact of utilizing an enhanced medical screening exam (MSE) on ED operational metrics. In order to validate the impact of utilizing an enhanced MSE, a simulation model will be used to test its effectiveness.

Study Design: Data for all ED discharges between November 1, 2012 and October 31, 2013 was collected from an academic medical center. For the top two ED diagnoses for the Medicaid/self pay populations, enhanced MSE protocols were developed. ED data was utilized to create inputs for a virtual ED environment. The simulation model was utilized to operationally mimic the effects of an enhanced MSE on patient pathways and ED metrics for all ED patients. The outputs from the model were analyzed using an independent t-test to determine the impact on ED length of stay [LOS] and room to discharge time.

Results: There were 64,385 ED cases included in this study with 80% of cases having an acuity level of three to five. Based on top diagnoses analysis, enhanced MSE protocols were developed for upper respiratory infection (URI) and chest pain. The virtual implementation of enhanced MSE protocols using simulation output indicated significant improvement in ED LOS (i.e., 22 minutes) and room to discharge time (i.e., 11 minutes) for all patients. For URI and chest pain patients, the reduction in ED LOS was 94 and 228 minutes on average, respectively.

Conclusions: The virtual implementation of the enhanced MSE for the three pilot conditions demonstrated the potential for significant improvements in operational metrics which in turn could reduce ED overcrowding. Operationalizing the enhanced MSE in the current ED environment will require: 1) coordination and collaboration with the primary care physicians and medical homes, 2) training for ED care providers, 3) optimal enhanced MSE point in patient treatment (i.e., triage using nurse practitioners vs. regular attending physician) and 4) potential policy changes. Based on implementation success, the enhanced MSE can be expanded to other diagnoses. Finally, the impact of enhanced MSE on patient experience and financial impact also needs to be studied.



Understanding the Preliminary Effects of the Medical Home Network on Emergency Department Usage at an Academic Medical Center

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Introduction: Frequent Emergency Department (ED) usage continues to afflict healthcare in terms of disease management as well as costs. Hence, many researchers and practitioners remain vested in understanding what determines and how to minimize frequent ED usage. In 2012, the state of Illinois implemented the Medical Home Network (MHN) healthcare paradigm with a key component being the assignment of Medicaid-eligible individuals to a primary care provider. In part, creators of the MHN intended for the connection of a patient to an exclusive primary care provider to reduce overreliance on already stressed EDs and optimize health and disease management through preventive care. The purpose of this study is to characterize the MHN patient population at an academic medical center to identify patient characteristics that we can address and develop into an intervention to reduce health disparities.

Methods: This study is a retrospective data analysis of all ED visits from January 1, 2013 to December 31, 2013. We compare MHN patients to non-MHN patients on the following five areas: 1) patient demographics (i.e. race, gender, and age); 2) ED visit characteristics (i.e. number per year); 3) comorbidities (i.e. diabetes, hypertension, asthma, cancer, and heart disease) ; 4) illness severity (i.e. acuity); and 5) disposition (i.e. admit, discharge, or transfer). Analyses include basic and higher-order tests in order to compare the two patient cohorts.

Results: We analyzed 64, 076 ED visits except for patients with erroneously entered data or those transferred to Labor and Delivery. Eight thousand patients belonged to the MHN patient cohort while 56,076 belonged to the non-MHN patient cohort. We found key trends differentiating MHN patients from non-MHN patients across all five areas. First, MHN patients consisted of 66.6% African American patients versus 53.6% for non-MHN patients. MHN patients consisted of 66.4% female patients compared to 56% for non-MHN patients. MHN patients had a mean age of 24 years versus 41 years for non-MHN patients. Second, ten percent of MHN patients visited the ED four or more times in comparison to five percent of non-MHN patients. Third, 2.6% of MHN patients have 2+ comorbidities versus 3.2% of non-MHN. Fourth, MHN patients (35.4%) more often presented in the ED with lower acuity (i.e. level 4) in comparison to non-MHN patients (24.2%). MHN patients (10.8%) less often presented in the ED with higher acuity (i.e. level 2) in comparison to non-MHN patients (18.2%). Fifth, 77% of MHN patients were discharged while 67% of non-MHN patients were discharged.

Discussion and Implications for Practice: Based on our preliminary data analyses, MHN patients are predominantly female, African-American, younger, and possess fewer comorbidities when compared to the non-MHN group. Despite these differences and participation in the MHN, these patients were more likely to visit the ED multiple times with lower acuity visits and higher rates of discharge. Our next step involves



higher-order analyses to better evaluate the subgroups of MHN patients with higher ED utilization and develop interventions for these populations. Another next step involves mixed-methods analyses (i.e. usage of quantitative and qualitative measures) to develop potential intervention strategies (e.g. patient navigation). These analyses will be geared toward the reduction of health disparities through decreased use of ED services and increased use of primary care services in these traditionally underserved populations.



Analysis of Emergency Department Consultation Times

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Background: Emergency Department (ED) crowding can lead to poor clinical and operational outcomes such as death and prolonged ED length of stay. Crowding depends on patient input, throughput, and output. ED throughput is the only component under direct control of the ED team. The ED team's evaluation is often supplemented by specialist consultation. Consultant evaluation of the patient and their communication regarding plan of care to the ED team can increase throughput time. Reduction in this time may improve ED patient flow metrics as well as reduce costs.

Objectives: Emergency medicine physicians seek specialist consultation on many of their complex patients but this consultation adds time to the emergency department (ED) evaluation. The goal of this project was to measure consultant times in a busy, urban, academic ED.

Methods: Using an innovative time-stamp tool on RedCap, a secure HIPPA-compliant online survey system, emergency medicine (EM) physicians logged the times of specialist consultation request, response, evaluation of the patient, and communication of final plan to the EM team. A total of 56 consults were logged over a six-week period in a convenience sample. Primary outcomes were response time (time from initial page to first response), total consultation time (time from initial page to final plan) and decision-making interval (time from first response to final plan).

Results: Mean response time was 15 minutes (95%Cl 11 to 19). Mean total consultation time was 134 minutes (95%Cl 111 to 156). Mean decision-making interval was 119 minutes (95%Cl 96 to 141).

We also compared surgical consults (General Surgery, Neurosurgery, Obstetrics and Gynecology, Ophthalmology, Orthopedics, Transplant Surgery, Trauma Surgery, Urology and Vascular Surgery) versus non-surgical consultants (Cardiac Intensive Care, Gastroenterology, Medical Intensive Care and Neurology). No statistically significant difference was observed between surgical and nonsurgical consults in response time (p=0.98), total consultation time (p=0.11), or decision-making interval (p=.10). However, the data showed trend toward a difference in total consultation time (mean 147 minutes vs. 109 minutes) and decision-making interval (mean 132 minutes vs. 94 minutes).

Conclusions: Mean total consultation time for all specialists was greater than 2 hours. Surgical consults showed a trend toward longer total consultation time and decision-making interval and further analysis with a larger sample size might indicate a statistically significant difference.



Analgesic Use in Six Urban Emergency Departments

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Background: Inadequate treatment of pain in the emergency department (ED) is an important issue in patient care, and understanding how pain is managed is vital to improving analgesic use in acute care environments.

Objective: The objective of this study was to analyze analgesic administration to patients presenting to the ED due to migraines, lower or upper extremity fractures, renal colic, cholecystitis, or bowel obstruction.

Methods: A retrospective review of 1652 patient charts from six urban university-affiliated EDs was completed. Pain severity, analgesic therapy, time to analgesic therapy, diagnosis, and patient disposition were determined.

Results: 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. Overall, 2.2x more patients received narcotic analgesics compared to non-narcotic analgesics. Patient-reported pain severity had no impact on time to first analgesic. Patients who entered the ED at night (0:00-7:59) had a 1.39 and 2.00x greater odds of receiving their first analgesic within 60 min as compared to patients entering the ED during the day and evening, respectively (57 vs. 48%, p<0.05, and 57 vs. 39%, p<0.001). Renal colic, lower extremity and upper extremity fracture patients had significantly greater odds of receiving their first patients had significantly greater odds of receiving their first patients had significantly greater odds of receiving their first patients had significantly greater odds of not receiving their first medication until after 120 minutes (p<0.001).

Conclusions: Pain pharmacotherapy in the ED for these common diagnoses is predominated by narcotics. Patient-determined pain rating had little effect on timing of medication, whereas patients entering the ED at night and those with a final diagnosis of renal colic or extremity fracture had increased odds of earlier analgesic use.



PE Prevalence From the NHAMCS Database 2007 to 2010

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Background: Emergency Department (ED) patients often present with signs and symptoms suggestive of pulmonary embolism (PE). As the use of advanced diagnostics increases, the ED prevalence of this disease could be increasing.

Objective: To determine the prevalence of PE in ED patients and in those considered "at risk" from the NHAMCS database between 2007 and 2010.

Methods: Clinically relevant vital signs and symptoms suggestive of PE defined the "at risk" population. Prevalence values were determined and generalized to all US ED patients.

Results: The NHAMCS database included on average 35,000 patients per year between 2007 and 2010. This represents an average of 127 million annual US ED visits. The prevalence of PE was 6 per 10,000 NHAMCS patients and did not change over the four years. In the 41% of patients defined as "at-risk", the prevalence was stable at 9 per 10,000. In the 139,502 NHAMCS patients, 156 had a PE over four years, with an overall mortality rate of 3.3%. This suggests an annual US rate of 76,200 diagnosed PE patients in those initially treated in the ED, with 2,286 estimated to die with this diagnosis. Of the 156 PE patients identified, 102 (65%) were identified as being "at risk".

Conclusions: In the NHAMCS database between 2007 and 2010, the ED prevalence of PE is relatively low when compared to other populations. The "at risk" group had a higher PE prevalence, suggesting the importance of using clinical criteria to determine the need for further diagnostic testing for this disease.



Pulmonary Embolism Prevalence in All Patient Populations Identified in the Medical Literature

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Background: Diagnosis of pulmonary embolism (PE) in Emergency Department (ED) patients remains a priority, necessitating the use of advanced diagnostics, such as CT angiography (CTA). Attempts to safely reduce chest CTAs depends, in part, on the presumed prevalence of PE in the patient population being evaluated.

Objective: To determine the prevalence of PE in general and in high-risk patient populations based on history, symptoms, signs, and laboratory testing.

Methods: A Medline search was conducted using relevant search terms and reports with a high-risk subgroup were included in this analysis. High-risk populations were identified by clinical judgment, symptoms, signs, PERC rule, Wells criteria, VQ testing, and D-dimer.

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

Conclusions: The PE point prevalence from the populations in the literature are sufficiently low that without clinical judgment, signs, symptoms, or tests indicating patients are high-risk, CTA use may not be necessary to exclude PE. However, in high-risk ED patients, the point prevalence rate approaches 40%, suggesting CTAs can be considered to exclude PE.



The Emergency Department Use of Advanced Diagnostics in Patients at Risk for Pulmonary Embolism, NHAMCS Data in 2007 to 2010

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Background: The evaluation of Emergency Department (ED) patients at risk for pulmonary embolism (PE) often requires computed tomographic angiography (CTA). The frequent use of this test has safety and resource implications. To best understand how to optimize CTA use, it is important to determine how often this test is utilized.

Objective: To estimate based on NHAMCS database records from 2007 to 2010, the frequency of CT use in the evaluation of patients, especially those considered at risk for PE.

Methods: Clinically relevant signs and symptoms suggestive of PE including abnormal vital signs (HR>120, RR>24, SBP<90, pOX<90) defined the at risk population. Because CTA was not specifically identified in the database, the assumption was made that all non-head CTs (NHCTs) in PE and in at-risk patients were chest CTAs.

Results: The NHAMCS database included on average 34,876 patients (127 million US ED visits) annually between 2007 and 2010. CT was used on average in 14.2% of all database patients, increasing 1% per year. PE was diagnosed in 16 per 10,000 NHAMCS ED patients and remained constant over time. An average of 7.5% of ED patients received NHCTs, increasing 0.7% per year. One out of 20 patients considered at high risk for PE received an NHCT.

Conclusions: Overall CT use in the evaluation of ED patients is on the rise. Despite a low prevalence of PE in the NHAMCS database, CTA use in the evaluation of at-risk patients is also increasing. This trend merit attempts to more closely investigate the use of advanced diagnostics in the ED.



Pulmonary Embolism Point Prevalence in Studies that Utilize Chest CTA in the Detection of Pulmonary Embolism

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Background: The pulmonary embolism (PE) point prevalence in at risk patients 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 demonstrates PE remains uncertain.

Objective: To determine the PE point prevalence rates in studies that utilize CTA in the diagnostic process, including high risk criteria patients.

Methods: Studies that identified the use of CTA in the diagnosis of PE in at risk patients were included in this meta-analysis. This report identifies the positive CTA rates from studies in which this modality was used to diagnose or exclude PE in at risk patients.

Results: Of 164 possible PE studies examined, 32 (20%) specifically reported the outcomes of CTA use for the diagnosis of PE and included 26,989 patients. The PE point prevalence rate in these 32 CTA use studies was $17.6 \pm 14.9\%$. ED studies of CTA use reported a lower CTA positive rate (10.1%) than studies from other clinical settings (27.1%). Studies that examined PE patients primarily had a lower CTA positive rate (15.0%) than those that primarily examined CTA clinical utility (21.7%).

Conclusions: The overall 17.6% point prevalence rates for PE in studies that examined CTA utilization were similar to the rates from other PE diagnostic studies. PE positive rates for ED CTA use was lower, averaging about 1 in ten patients studied. Further studies may lead to improved CTA use so that ED CTA positive rates for PE will resemble the overall average and rates seen in other clinical settings.



Traumatic and Atraumatic Dental Patient Emergency Department Visit Data In the NHAMCS Database Between 2007 and 2010

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Background: Dental conditions account for many Emergency Department (ED) visits each year. Better understanding into the frequency of visits will optimize preparation for the management of these patients.

Objective: To estimate, based on NHAMCS database records of 2007-2010, the frequency of ED visits for dental conditions and examine the type of health care insurance of these patients.

Methods: Analyzed was NHAMCS data of ED visits for dental conditions between 2007 and 2010. Data was generalized to the number of total ED visits within the U.S per year.

Results: The NHAMCS database included an average of 34,876 patients annually between 2007 and 2010, representing approximately 127 million US ED visits per year. Dental conditions were cited as the reasons for patient visit (primary, secondary, or tertiary reason) in 1.08% of database patients, or on average, 375 ± 45 ED dental patients in the database per year. This number of NHAMCS patients corresponds to 1,371,600 dental emergency patients treated in US Emergency Departments each year. There was a slight decrease in dental patients seen between 2007 and 2009, with an increase seen in 2010. In the NHAMCS database, 49% of these dental emergency patients were privately insured, 11% had Medicare, 25% Medicaid, and 15% were self-pay.

Conclusions: The NHAMCS database shows that 1 per 100 ED patients present for dental emergencies. Despite the notion that dental patients present to the ED because they lack health insurance, the NHAMCS patient data showed that private insurance is the most common health coverage, and that 85% had some type of health coverage. More information on dental insurance coverage is needed in order to better understand this patient self-referral pattern to the ED.



The Effect of a Geographical/Acuity Based Staffing Model vs. Rotational Staffing Model on Time to Treatment in the Emergency Department

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Background: Various methods exist to assign patients to providers in the emergency department (ED) setting, with uncertainty remaining as to which methods may best alleviate crowded hospital conditions and optimize patient flow. Two of these methods include geographical/acuity based (where patients within a specific geographical space in the ED are assigned to specific providers) and rotational based (where patients are assigned to providersbased on arrival time, irrespective of geographical placement in the ED).

Objectives: We sought to compare time to treatment measurements in a geographical/acuity based patient assignment model to a rotational patient assignment model in a large metropolitan hospital, hypothesizing reduced times to each metric in the newer rotational patient assignment model. Methods: We reviewed data from visits of patients aged 19 years and older seen at our hospital during 2 separate 4 week periods with two different patient assignment models. From May 1, 2012 to May 30, 2013 patients were assigned to physicians via a geographical/acuity model. This was compared with patients seen from June 16, 2013 through July15, 2012, who were assigned to physicians via a rotational model. We compared length of stay (LOS), time to first provider (TTFP), time to bed (TTB), time to nurse (TTN) and time to disposition (TTD) utilizing nonparametric statistical analysis with correction for multiple statistical tests.

Results: A total of 11,537 visits were analyzed. TTFP for the geographical/acuity-based model was 32 minutes compared with 38 minutes for the rotational model (p<0.001). TTD was also shorter in the geographical/acuity-based model at 182 minutes compared to 193 minutes (p<0.001). Changes in overall LOS, TTN, and TTB were not statistically significant.

Conclusion: Unexpectedly, a new rotational patient assignment model did not improve emergency department timing metrics when compared to a geographic/acuity based assignment model in our hospital.