

GUN VIOLENCE IN CHICAGO AND BEYOND: CONTINUUM OF CARE



FEATURING GARY SLUTKIN, MD

THURSDAY, MAY 4, 2017

2017 ICEP SPRING SYMPOSIUM

Northwestern Memorial Hospital | Chicago, Illinois

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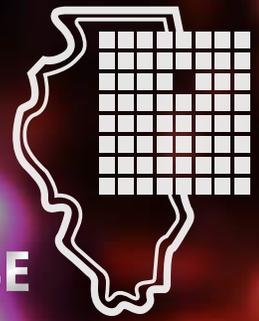
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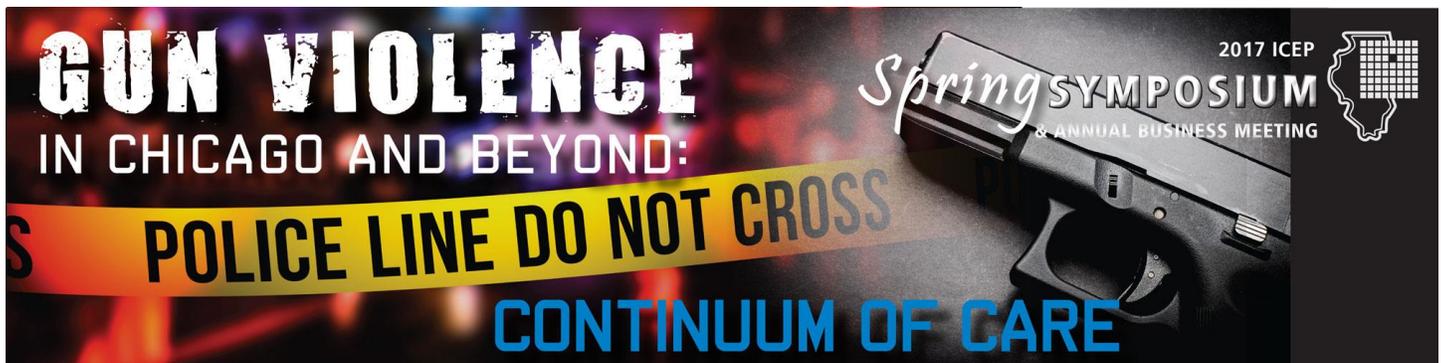
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The Effect of a Quality Improvement Initiative on Process and Outcome Measures in Patients with Septic Shock

Mobola Y. Kukoyi, MD, MPH; James Walter, MD; Michael Ward, MD
The University of Chicago, Chicago, IL

Background:

Quality improvement (QI) initiatives can lower mortality rates in patients with septic shock. Our ED implemented a QI initiative, involving creation of a sepsis screening protocol, a flagging system that includes notification of nursing management and pharmacy staff, and an education component aimed at optimizing fluid management and other elements of sepsis care.

Objective:

1. To compare pre- and post-intervention metrics and patient outcomes
2. To identify areas of improvement in our ED sepsis management pathway

Design/Methods:

A retrospective chart review of 74 patients meeting the definition of septic shock presenting to the ED from July-December 2012 and June-July 2016 was performed. Septic shock was defined as suspected or confirmed infection, ≥ 2 SIRS criteria, and either refractory hypotension (SBP < 90 or MAP < 65 after a 1L fluid challenge) (overt shock) or a serum lactate ≥ 4 (covert shock). Preliminary analyses were performed using chi-square and two-tailed t-tests.

Results:

Age, gender, race, initial lactate, and shock characterization (overt vs covert) were similar between the pre- and post-initiative groups. There was an improvement in time to antibiotic completion (240 [SD = 148] vs 168 minutes [SD=104], $p=0.01$), and rate of inferior vena cava ultrasound (3% vs 46%, $\chi^2 (1) = 17.4$, $p < 0.01$) for the pre- and post-initiative groups, respectively. The post-initiative group showed a decrease in the placement of central venous catheters (52% vs 19%, $\chi^2 (1) = 8.4$, $p < 0.01$), a trend towards decreased use of vasopressors (39% vs 20%, $\chi^2 (1) = 3.5$, $p = 0.05$), and a trend towards improved mortality (33.3% vs 14.6%, $\chi^2 (1) = 3.6$, $p = 0.05$). There were no differences found for lactate screening within three hours, repeat lactate measurement within six hours, length of ED stay, volume of fluids, administration of a 30cc/kg bolus within three hours, or documentation of sepsis in the ED chart.

Conclusion:

The post-initiative group showed improvement in timely antibiotic administration, use of ultrasound-guided fluid resuscitation, a decrease in use of central venous catheters, and a trend towards decreased vasopressor use and mortality.

Impact:

The study showed an improvement in sepsis management after the sepsis quality initiative and will help to inform future interventions.



A Randomized Controlled Trial of Budesonide versus Acetazolamide on Rapid Ascent: Altitude Sickness Prevention and Efficacy of Comparative Treatments (ASPECT)

Grant Lipman MD; David Pomeranz, MD; Nick Juul, MD; Patrick Burns, MD; Mary Cheffers, MD; Kristina Evans, MD; Carrie Jurkiewicz, MD; Peter Hackett, MD;
The University of Chicago, Chicago, IL

Background:

Inhaled budesonide has been suggested as novel preventative medication for acute mountain sickness (AMS). However, efficacy has not been compared to the standard AMS prophylactic acetazolamide nor on rapid ascent.

Objective:

Evaluate inhaled budesonide and oral acetazolamide compared with placebo for their efficacy in prevention of AMS.

Design/Methods:

This double-blind, randomized, placebo-controlled trial compared inhaled budesonide to oral acetazolamide to placebo starting the morning of ascent from 1,240 m (4,100 ft) to 3,810 m (12,570 ft) over 4 hours during August 2016 on White Mountain, California. The primary outcome was AMS incidence (headache and Lake Louise Questionnaire ≥ 3 and another symptom).

Results:

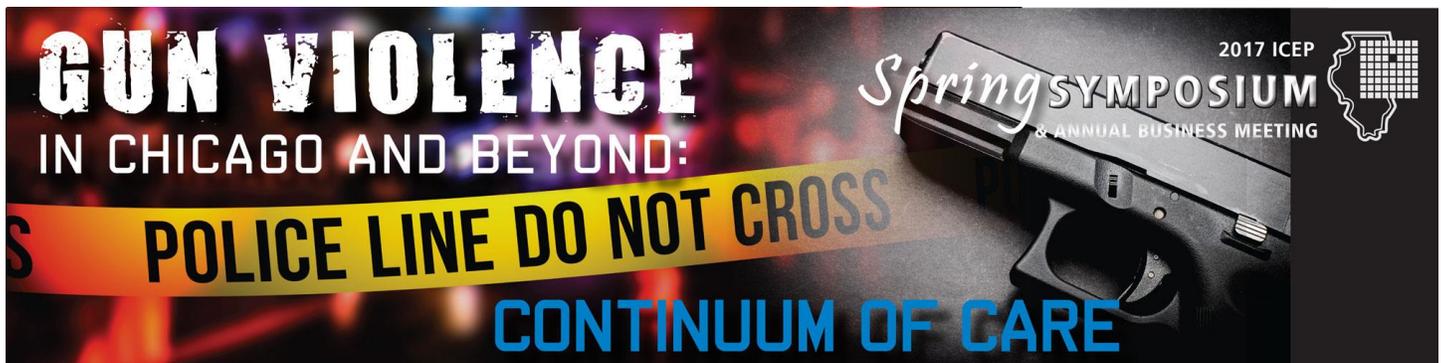
103 participants were enrolled and completed the study; 33 (32%) received budesonide, 35 (34%) acetazolamide, and 35 (34%) placebo. There were no differences in demographics between the groups ($p > 0.09$). Total AMS incidence was 73%, with severe AMS 47%. Fewer participants in the acetazolamide group 15 (43%) developed AMS compared to both budesonide 24 (73%) (OR = 3.5, 95% CI 1.3 – 10.1) and placebo 22 (63%) (OR = 0.5, 95% CI 0.2 – 1.2). Severe AMS was reduced with acetazolamide 11 (31%) compared with both budesonide 18 (55%) (OR = 2.6, 95% CI 1 – 7.2), and placebo 19 (54%) (OR = 0.4, 95% CI 0.1 – 1), with a number needed to treat of 4. Smaller increases in ventilation were associated with greater symptoms of AMS, with EtCO₂ a better predictor of AMS than SpO₂ ($r = -0.26$, $p = 0.01$ versus $r = -0.19$, $p = 0.05$).

Conclusion:

Budesonide was found to be ineffective for the prevention of AMS, and acetazolamide was preventive of severe AMS taken just prior to rapid ascent.

Impact:

This study was the first to compare inhaled budesonide against acetazolamide, the standard of care for chemoprophylaxis of AMS. Based on our study, budesonide should not be recommended for prophylactic use against AMS.



Change in Payer Mix at Disproportionate Share Hospitals in Illinois Following Implementation of the Affordable Care Act

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Background:

The implementation of the Affordable Care Act (ACA) reduces Disproportionate Share Hospital (DSH) payments because of presumed changes in payer mix.

Objective:

We evaluate the change in payer mix at DSH in Illinois before and after ACA insurance expansion.

Design/Methods:

This was a retrospective analysis of administrative data from the Illinois Hospital Association Health Care and Hospital Data Reporting Services (COMPdata) data set from 3rd quarter 2010 to 2nd quarter 2015. Visits at Illinois hospital-based Emergency Departments (EDs) were included for analysis. EDs at hospitals declared DSH by the Illinois Health and Human Services website for each year from 2011-2013 were classified as DSH EDs. EDs at hospitals which were never classified as DSH from 2011-2013 were defined as non-DSH. ED visits were categorized by primary payer: private, Medicaid, Medicare, and uninsured. Chi square analysis for proportions and difference in differences (DiD) were used to compare changes between DSH and non-DSH EDs in payer mix before and after ACA health insurance expansion (January 1, 2014). Visits are reported as percent of overall patient visits by primary payer. DiD is reported as change in visits/year at DSH hospitals compared to non-DSH hospitals.

Results:

Thirty-three DSH EDs were identified. After ACA insurance expansion, Medicaid visits increased from 34.7% to 39.6% of all visits at DSH and 26.4% to 33.9% at non-DSH (DiD = -39,000 patients/year for DSH EDs compared to non-DSH, $p=0.001$). Uninsured visits at DSH decreased from 24.8% to 16.7% and from 22.8% to 15.3% at non-DSH (DiD = +34,000, $p<0.001$). Privately insured patients increased from 30.6% to 34.9% and 41.7% to 41.9% at DSH and non-DSH respectively (DiD = +2,600 $p=0.6$).

Conclusion:

Though DSH and non-DSH EDs both had increases in Medicaid visits and decreases in uninsured visits, the magnitudes were significantly different. Compared to non-DSH hospitals DSH hospitals have had a smaller increase in Medicaid visits and a smaller decrease in uninsured visits. These findings suggest that DSH hospitals continue to bear a larger burden of uninsured care than non-DSH hospitals after ACA implementation.

Impact:

DSH EDs bear a larger burden of under and un-insured patients post-ACA.



Outcome of Patients Over 80 Years of Age after Thrombolysis for Acute Ischemic Stroke in a Community Hospital Emergency Department

Kunal Patel, MD; Michael Stanek, MD; Logan Traylor, MD; Jessica Ede, MD;
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Background:

Treatment of acute ischemic stroke via thrombolysis with tPA is typically recommended with a warning for caution for patients over 80 years of age. Nevertheless, with an aging population, a greater number of elderly stroke patients are receiving tPA.

Objective:

We sought to evaluate the rates of intracerebral hemorrhage (ICH) and functional outcome in patients over the age of 80 treated with tPA in our ED.

Design/Methods:

We performed a retrospective study of patients presenting to our community hospital ED over a 44-month period (from January 2012 to September 2015) with symptoms of stroke who were treated with tPA. Outcomes were determined by medical record review, with ICH defined as radiographically identified hemorrhage, and favorable outcome as an mRS < 2.

Results:

A total of 119 patients were treated over the study period, and 33 patients were over the age of 80 years. Of this group, the mean age was 88.6, median 87, with IQR 85 to 92.5 years. The oldest patient 97 years of age, and the group was 75.8% female (25 female, 8 male patients). Median NIHSS score was 11, with IQR 8 to 18. A total of 7 patients (21.2%) developed an ICH, and of these, 3 patients (42.9%) died. Overall mortality for the cohort of patients over the age of 80 was 18.2% (6 out of 33), and median mRS at discharge was 3 (IQR 1 to 4), with 6 patients (18.1%) achieving a favorable (mRS < 2) functional outcome.

Conclusion:

Patients over the age of 80 years presenting with acute ischemic stroke in our ED and receiving treatment with thrombolysis face higher rates of ICH and mortality than typically quoted for the broader cohort of acute ischemic stroke patients.

Impact:

Incorporation of these findings in discussions of treatment decisions with patients and families may be warranted.



Pediatric Croup Treatments and 72 Hour Returns to the ED

Nicole Colucci, DO; Ami Gohil, MD; Shu B. Chan, MD, MS;
Presence Resurrection Medical Center, Chicago, IL

Background:

Croup is a common childhood self-limiting upper respiratory illness. A common problem that Emergency Department (ED) physicians encounter with the management of croup is determining which treatment(s) may best avoid a future revisit to the ED.

Objective:

To investigate different croup interventions and determine the effect of those interventions on likelihood to return to ED.

Design/Methods:

12-month retrospective study of electronic medical records from two community ED. Included are all patients ≥ 18 years old with a diagnosis of "croup". Excluded were patients with concurrent diagnosis of asthma, patients with history of recurrent upper airway reaction, or acute allergic reactions. Data abstracted include treatments, outcomes, disposition, and ED return for croup within 72 hours of the index visit. Differences between patients with 72 hours returns were tested using Student-t or Fisher exact tests as appropriate. Significance was set at a two-tailed p-value of 0.05.

Results:

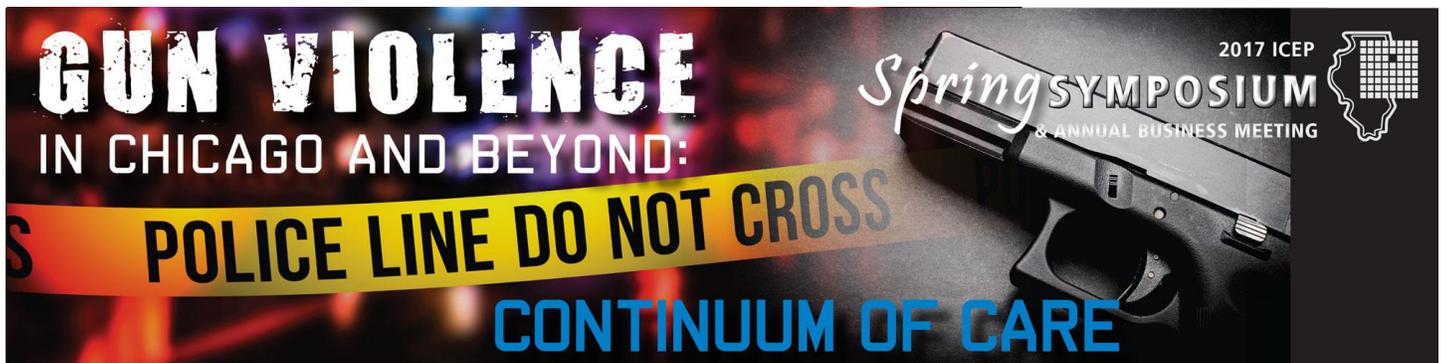
186 patients met the inclusion/exclusion criteria. The median age was 2.0 years (IQR: 1.0, 4.0) with 68.8% male. While in the ED, 51.1% were treated with steroids only while 46.2% received both steroid and nebulized adrenergic agents. Dexamethasone was used in 181 of the 186 patients (97.3%). The mean dexamethasone dose given was 0.47mg/kg (SD: 0.20) with 82.2% given orally. In the 88 patients given nebulized treatments, 50.0% were given racemic epinephrine, 30.7% received albuterol, and 19.3% received both. The median length of ED stay was 142 minutes (IQR: 108, 208). On disposition, 169 (90.9%) were discharged home. Of the discharged patients, there were 7 patients (4.1%) found returning to the ED within 72 hours of the index visit. Those patients who returned were significantly younger (1.5 versus 2.8 years; $p=.007$) and more likely female (71.3% versus 30.9%; $p=.038$). Treatments with racemic epinephrine or albuterol or discharged with steroid during the prior ED visit was not significantly correlated with ED return.

Conclusions:

In this community ED study of pediatric croup, 97.3% were treated with dexamethasone. There were 4.1% 72-hours ED returns. Returning patients were significantly younger and more female. Type of prior ED treatments were not correlated with returns.

Impact:

Regardless of racemic epinephrine or outpatient steroids, there is still 4.1% return rate for pediatric croup patients.



Correlation of Elevated BNP and Renal Function with LVEF Within 48 Hours of Emergency Department Presentation

Shu B. Chan, MD, MS; Avram Estes, MD; Greg Richardson, MD;
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Background:

It is known that BNP (B-type natriuretic peptides) may be elevated with chronic renal disease. LVEF (left ventricular ejection fraction) < 40% has both diagnostic and therapeutic implications for patients while in the ED.

Objective:

Determine the ability of a single ED BNP to predict LVEF controlled for different renal functions. Review the sensitivity and specificity of selected BNP cut off values by renal status.

Design/Methods:

Retrospective electronic chart review performed for patients admitted from the ED at two community teaching hospitals. Included are adult patients who had BNP >100 in the ED and LVEF measurements made within 48 hours of the ED visit. GFR (glomerular filtration rate) in the ED was grouped as "normal" (GFR>60), "G3a" (GFR 45-59), "G3b" (GFR 30-44), "G4" (GFR 15-29), and "G5" (GFR<15 or dialysis). Echocardiographic LVEF were categorized into low (LVEF<40%) and normal. BNP mean comparisons were done using Student-t while AUC, calculated from ROC analysis was used to compare predictive ability over different renal status. Significance is set at .05. Data collection was repeated on 10% of the sample. The kappa coefficient of agreement on the key items of GFR and LVEF were 1.00, and 1.00 respectively. Sample size is set at 500.

Results:

Preliminary results on 382 patients showed that BNP of low LVEF patients were significantly higher than normal LVEF across renal groups; normal renal (1016 vs. 446; p=.016), G3a (1241 vs. 674; p=.009), G3b (1564 vs. 680; p=.006), and G4 (1496 vs. 731; p=.041). The ROC curves and AUC were also significant across renal groups; normal renal (AUC 68.1%; p=.008), G3a (AUC 71.5%; p=.005), G3b (AUC 69.3%; p=.007), and G4 (69.7%; p=.031). Examples of BNP ROC points are given with (sensitivity, specificity): normal renal BNP at 277 (.818, .400), G3a BNP at 359 (.850, .400), G3a BNP at 369 (.773, .403), and G4 BNP at 419 (.769, .426).

Conclusions:

Preliminary results show that across all renal groups except G5, there were significant differences between BNP of low and normal LVEF. Also except for G5, ROC curves and AUC were significant across renal groups with similar predictability for low LVEF. However, the set points for a given sensitivity and specificity will increase as renal function decreases.

Impact:

BNP measurement in the ED can predict low LVEF but the cut off values will increase with decreasing renal function.



Should Routine Bedside Ultrasound be Performed During the Evaluation of all Septic Patients Presenting to the Emergency Department?

Connie Swickhamer, DO; William Parente, MD; Joseph Grueter, MD; Shu B. Chan, MD, MS;
Presence Resurrection Medical Center, Chicago, IL

Background:

Abdominal sepsis is associated with mortality rates of up to 50%. With cholecystitis being one of the most common causes, early detection is important to start appropriate antibiotics and obtain early surgical intervention. It is hypothesized that routinely performing bedside ultrasounds on septic patients would provide the benefit of earlier detection of cholecystitis.

Objective:

The purpose of this study is to evaluate whether bedside right upper quadrant (RUQ) and/or renal ultrasound should be routinely performed during the initial evaluation of all septic patients presenting to the emergency department.

Design/Methods:

A prospective study was conducted at a single community Emergency Department. Bedside RUQ and Renal ultrasounds were performed by emergency medicine trained residents and attending on patient's who ruled in for sepsis (confirmed or suspected source of infection in addition to 2 out of the 4 systemic inflammatory response syndrome criteria) and were greater than 18 years of age. Age, sex, SIRs criteria, suspected source with certainty, blood cultures, presence of anterior wall thickening, pericholecystic fluid, biliary sludge, sonographic murphy's sign, common bile duct dilatation, hydronephrosis, and intra-abdominal free fluid were recorded. If initial ultrasound was suspicious for acute cholecystitis, confirmatory testing, either a CT scan of the abdomen and pelvis or formal RUQ ultrasound, was then performed and evaluated.

Results:

There were 14 patients enrolled in this prospective pilot study. The mean age was 72.3 with standard deviation of 22.9 years and 42.9% (6/14) males. There were two patients with bedside evidence of acute cholecystitis (AC), both confirmed, one on CT, one on repeat US. There were two patients with bedside evidence of acute cholecystitis (AC), both confirmed, one on CT, one on repeat US. Of the two AC found on bedside US, one had an unknown source but one already had suspected AC. There were three patients with bedside evidence of hydronephrosis, two confirmed on CT but one not. The two confirmed cases both were diagnosed as just urine infection prior to the bedside US.

Conclusions:

In this small pilot study of bedside ultrasound in septic patients, 21.4% (3/14) of the patients had a bedside US which changed their diagnosis and management.

Impact:

In suspected abdominal sepsis without a clear source, bedside ultrasound of the gallbladder and kidneys may be useful.



Happiness and the Emergency Medicine Resident

Natalyn Wong, MD; Shu B. Chan, MD, MS; Marc A. Dorfman, MD;
Presence Resurrection Medical Center, Chicago, IL

Background:

Wellness programs began in residencies after the high burnout/suicide rate of physicians were highlighted in recent news. Previous studies have found that participating in wellness programs can be beneficial for residents. Having a tool that can increase the residents' happiness could improve residents' longevity, learning abilities, and ultimately patient care.

Objective:

Determine the happiness scores of EM residents and the effect of wellness programs on happiness.

Design/Methods:

In this cross-sectional survey study, 263 Emergency Medicine (EM) residents from seven ACGME accredited EM residency programs in Illinois were invited to complete a brief questionnaire including a validated happiness scale. Other questions included participation in any residency wellness program. A separate questionnaire was sent to program directors regarding details of wellness programs. Analysis of the happiness scale suggested that a sample size of 24 per group would give 80% power to find at least 1.0 point difference between groups.

Results:

There were 86 completed responses (33% response rate). The mean age was 29.2 (SD: 3.8) with 62.8% male. 29% were PGY 1, 37% were PGY 2, and 34% were PGY 3/4. Wellness programs were available at six of seven sites but only 78% of the residents were aware of their own programs. Only 40 residents participated (46%) in a wellness program. Overall, the mean happiness score was 5.1 (SD: 1.3) which compares to prior published results of 4.9 (SD: 1.3) for college students and 5.6 (SD: 0.96) for general adults. The 40 residents who participated in a wellness program scored 0.4 points higher than non-participants but the differences were not significant. (5.3 vs. 4.9; $p=0.17$). The happiness score was also not significantly different when compared by gender ($p=0.10$), training level ($p=0.61$), marital status ($p=0.82$), or site ($p=0.88$)

Conclusions:

The happiness scores of EM residents are similar to the general population and participation in a wellness program does not significantly improve happiness. However only 46% of residents participated in a wellness program and 22% of residents were not aware of their own programs.

Impact:

Although wellness programs may or may not improve happiness, they are an important component of all residency programs and should be better advertised.



Examining the Effect of the Affordable Care Act on Emergency Department Visits at a Level 1 Trauma Center

Michael Cirone, MD; Lauren Stevens, MPH; Talar Markossian, MPH, PhD;
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Advocate Christ Medical Center, Oak Lawn, IL, Loyola Stritch School of Medicine, Maywood, IL

Objectives:

To compare Emergency Department (ED) volumes and utilization patterns before and after the implementation of the Affordable Care Act (ACA) by applying a previously validated severity algorithm¹ to classify ED visits as “non-emergent” “intermediate” or “emergent”.

Background:

The ACA promised to provide improved access to primary care for previously uninsured patients thereby decreasing ED visits. Recent studies suggest that ED visits in Illinois have actually increased since ACA implementation². There is a paucity of data regarding its effect on ED patient demographics and visit acuity.

Methods:

An IRB approved retrospective review of ED visits from 1/1/2013 to 1/1/2015 was performed. Patient demographics and ED volumes during the 12 months before and after implementation of the ACA were compared. The Billings/Ballard algorithm was applied to categorize visits as “non-emergent” “intermediate” or “emergent”. Logistic regression was used to compare patient characteristics and acuity pre and post ACA.

Results:

The total number of ED visits was unchanged following implementation of the ACA. The number of Medicaid patients increased by 5% and there was 4% decrease in uninsured patients. According to the Billings/Ballard algorithm, the number of “non-emergent” ED visits increased by 8%.

Conclusions:

Implementation of the ACA did not affect ED volume or alter patient demographics. There was a significant increase in Medicaid coverage following ACA implementation. Application of the Billings/Ballard algorithm showed that an increased number of visits were classified as “non-emergent” following ACA implementation. However, there was no correlation between insurance status and ED utilization.

Impact:

It is likely that the ACA will be altered or replaced in the near future. In order to ensure improvement, it is essential for healthcare providers and legislators to have a nuanced understanding of the successes and shortcomings of the ACA. While the number of uninsured patients has clearly decreased as a result of the ACA, this study suggests an increased number of low acuity ED visits. There will need to be improved access to primary care in future healthcare reform.

References:

1. Ballard DW, Price M, Fung V., Brand R, Reed, ME, Fireman B, Hsu J. Validation of an Algorithm for Categorizing the Severity of Hospital Emergency Department Visits. *Medical Care*, 2010. 48(1), 58-63.
2. Dresden S, Powell E, Kang R, et al. Increases Emergency Department Use in Illinois After Implementation of the Patient Protection and Affordable Care Act. *Annals of Emergency Medicine*. 2017. 69 (2) 172-180



A Needs Assessment for a Longitudinal Emergency Medicine Intern Curriculum

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Background:

A key task of emergency medicine training programs is to develop a consistent knowledge of core content in recruits with heterogeneous training backgrounds. The traditional model for delivering core content is lecture-based weekly conference; however, growing body of literature finds this format less effective and less appealing than alternatives, particularly for millennial learners.

Objective:

We aimed to validate the hypothesis that residents value dynamic, training level-specific education by conducting an attitudinal needs assessment for a novel longitudinal intern curriculum for millennial learners.

Design/Methods:

We conducted an online survey of all residents from the six emergency medicine programs in the Chicago area regarding the concept, format, and scope of a longitudinal intern curriculum. Results were analyzed both in total and by a subgroup of interns.

Results:

We received 153 responses from the 300 residents surveyed (51% response rate). Most residents (80%, interns: 82%) agreed or strongly agreed that a dedicated intern curriculum would add value to residency education. The most positively rated teaching method was simulation sessions (91%, interns: 91%) followed by dedicated weekly conference time (75%, interns: 84%) and dedicated asynchronous resources (71%, interns: 69%). Less than half of residents (47%, interns: 26%) supported use of textbook readings in the curriculum.

Conclusion:

There is strong learner interest in a longitudinal intern curriculum. Preferred methods of instruction favor hands-on experiences and dedicated asynchronous resources.

Impact:

These results clearly show the perceived value of level-specific education; however, these resources will require significant effort to develop. Collaborative efforts could considerably reduce this burden, and this needs assessment can serve as a guide to inform the development of an intern curriculum for millennial learners on a national level.



Teaching Sepsis: An Innovative Medical Education Initiative to Improve Sepsis Management in the Emergency Department

Racheal A. Gilmer MD; Michael Ward, MD;
The University of Chicago, Chicago, IL

Background:

Sepsis protocols have been shown to significantly lower mortality rates. A protocol was developed at the University of Chicago emergency department (ED), but its use was inconsistent.

Objective:

Given the nature of academic EDs, treating providers are continually changing. An online tutorial, focusing on sepsis education and protocol use was developed. We hypothesized online training would improve provider knowledge and the use of the sepsis protocol in patients with severe sepsis and septic shock (SS/SS).

Design/Methods:

The tutorial was given to residents rotating through the ED beginning July 2016. Compliance surrounding process measures were captured for individual providers before and after training. Charts were identified using CMS-specified ICD-10 codes for SS/SS. Pre- and post-test questions were used to assess understanding of sepsis fundamentals.

Results:

From February-September 2016, 90 charts were abstracted with 55 providers completing the training. There were similar rates of shock (61.8 vs 51.4%, $\chi^2(1, N=90)=0.95$, $p=0.33$) and mortality (23.6 vs 14.3%, $\chi^2(1, N=90)=1.17$, $p=0.28$) for the pre- and post-tutorial groups, respectively. The post-tutorial group showed improvement in the use of the order set (29.1 vs 51.4%, $\chi^2(1, N=90)=4.54$, $p=0.033$) and timer (30.9 vs 65.7%, $\chi^2(1, N=90)=10.5$, $p<0.01$). There was no improvement in the initiation of antibiotics (87.3 vs 91.4%, $\chi^2(1, N=90)=0.37$, $p=0.54$), fluid administration (58.2 vs 51.4%, $\chi^2(1, N=90)=0.4$, $p=0.53$), initial lactate (100 vs 97.1%, $\chi^2(1, N=90)=1.6$, $p=0.21$), or fluid documentation (27.3 vs 14.3%, $\chi^2(1, N=90)=2.08$, $p=0.15$) for the pre- and post-tutorial groups, respectively. There was a decrease in repeat lactate measurement (98.2 vs 85.7%, $\chi^2(1, N=90)=5.34$, $p=0.021$) for the post-tutorial group. The post-test showed improved accuracy of survey questions (43.5 [SD=24.5] vs 57.0% [SD =35.1], $t(54)=2.66$, $p=0.01$) compared to pre-test questions.

Conclusion:

Completion of the tutorial showed an improvement in the use of sepsis process tools but no change in the downstream process measures. The accuracy of test survey questions was improved after training.

Impact:

Preliminary data shows that using an online tutorial is an efficient means to educate providers on sepsis fundamentals and improve compliance with protocols; however, continued chart abstraction is needed to inform tutorial changes to optimize learners' education and improve compliance in sepsis process measures.

GUN VIOLENCE

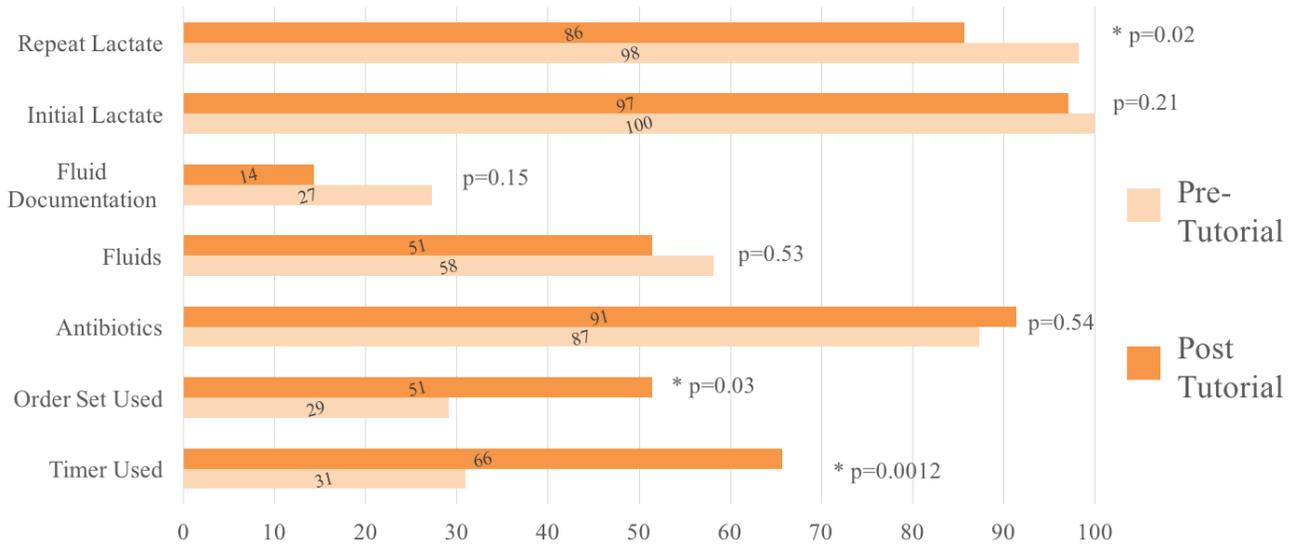
IN CHICAGO AND BEYOND:

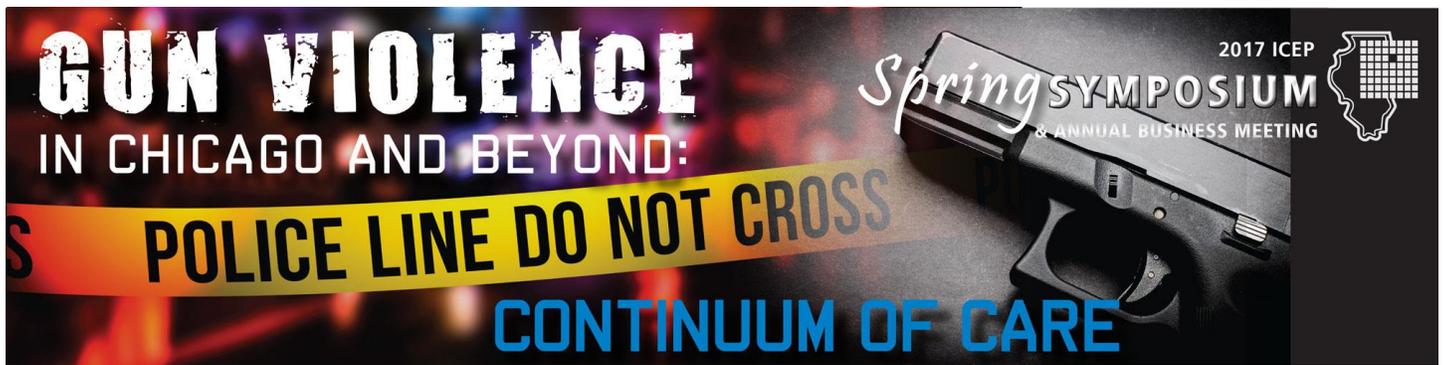
2017 ICEP
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Process Measures Pre and Post Tutorial





Successful Implementation of a Model Cell to Improve Emergency Department Throughput

Paul Casey, MD, FACEP; Yanina Purim-Shem-Tov, MD, MS, FACEP; Dino Rumoro, DO, MPH, FACEP;
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Background:

Over the past decade there have been a many applications of lean management to healthcare and specifically to the emergency department (ED) but many do not lead to sustained improvement.

Objective:

Evaluate if implementation of the Thedacare model-cell lean methodology results in sustained improvement in ED operations.

Design/Methods:

We analyzed operations metrics of arrivals, left without being seen (LWBS), arrival to provider, arrival to discharge and patient experience (Press-Ganey surveys). We formed a process improvement team, surveyed staff, and conducted process observations to identify areas of lean waste. We organized items into a control-impact analysis, then prioritized solutions based on an effort-impact chart for implementation. We also instituted daily huddles and leadership rounds for continued process improvement. On September 1st, 2015 we initiated our new processes and analyzed data pre-process improvement (March 2015-August 2015) and post- (September 2015-July 2016) process improvement.

Results:

We demonstrated significant improvements in all metrics: LWBS for the time of pre-implementation was 6.2% vs post- implementation 4.8 % (last quarter 3.1%); door to provider, 71 min pre-implementation and 53 min post-implementation (last quarter 36 min); arrival to discharge, 233 min pre-implementation, 219 min post-implementation (last quarter 192 min); overall Press-Ganey University Health Consortium (UHC) rank 13% pre-implementation, to as high as 88% post-implementation. We also isolated ED boarding over 150 minutes as an independent factor negatively impacting ED throughput.

(See graph on next page)

Conclusion:

We have demonstrated the successful implementation of a model-cell in the ED can positively impact ED operations and patient experience.

Impact:

For EDs looking for a solution to throughput challenges the Thedacare model-cell lean methodology can result in significant sustained improvements in throughput and patient experience. [Click here to return to Table of Contents](#)

GUN VIOLENCE

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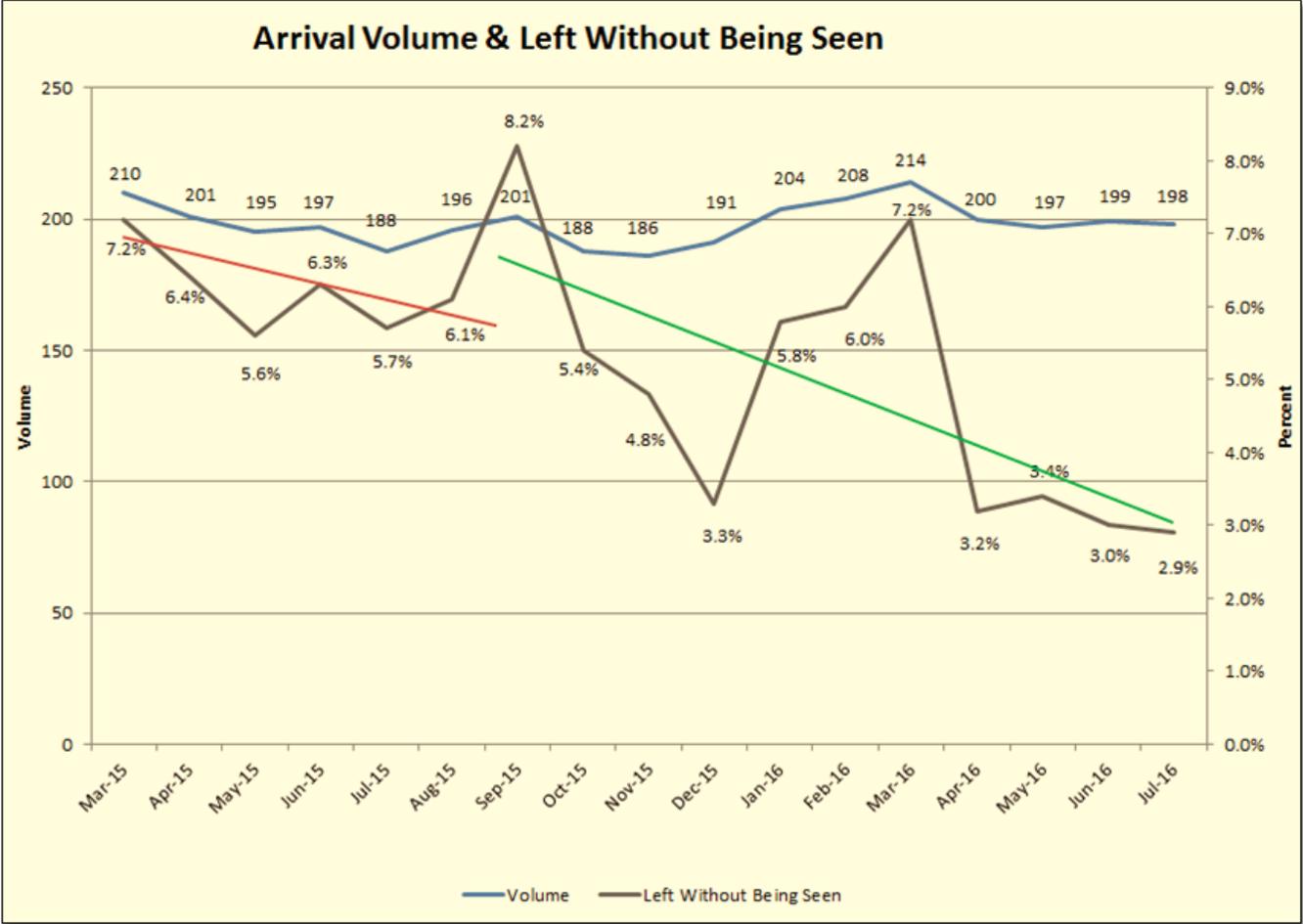


Figure 1. Arrival Volume & LWBS Pre- (red trendline) and Post-Implementation (green trendline)



Caring for a Critically Ill Simulated Left Ventricular Assist Device Patient With or Without a Cognitive Aid Improves Physician Comfort

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Background:

The number of left ventricular assist devices (LVADs) implanted is increasing yearly. Despite this growing number, physician education on this patient population remains inconsistent. High fidelity simulation is a useful tool for education and assessment in the healthcare setting.

Objective:

Using high fidelity simulation, we sought to assess the comfort level of our Emergency Department (ED) providers caring for critically ill LVAD patients, with and without the use of an adjunctive cognitive aid (Figure 1).

Design/Methods:

We modified our Laerdal 3G simulator to reflect an LVAD patient by decreasing the volume of his heart tones, turning off peripheral pulses and by placing a personal stimulation device in the chest cavity. Twenty groups cared for a simulated LVAD patient who was suffering from a gastrointestinal bleed and a suction event. Groups were composed of one attending and 1-2 resident physicians. The first 10 scenarios were run without access to a cognitive aid; the second 10 groups had access to a cognitive aid. Participants were evaluated based on 11 predetermined critical actions for the case and completed a pre and post-simulation survey.

Results:

The majority of caregivers (96%) care for < 5 LVAD patients per month. 74% of participants had cared for less than 30 LVAD patients. We found no significant differences in a team's delivery of appropriate care whether a cognitive aid was utilized or not. 92% of participants who were given the aid felt it was useful and 100% would use it during patient care. After participating in the simulation, all participants felt significantly more comfortable taking care of hypotensive ($p < 0.05$) and crashing ($p < 0.05$) LVAD patients.

Conclusion:

Although participants felt the cognitive aid would be useful, our data supports that participation in the simulation increased physician comfort level regardless of the cognitive aid.

Impact:

LVAD placements are increasing nationally. Simulation can increase an ED provider's comfort level in caring for unstable LVAD patients. For those providers that cannot participate in simulation, a cognitive aid that outlines common LVAD emergencies may also be useful.



Outcome by Gender after Thrombolysis for Acute Ischemic Stroke in a Community Hospital Emergency Department

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Background:

Treatment of acute ischemic stroke (AIS) via thrombolysis with tPA involves known risks of intracerebral hemorrhage (ICH) and subsequent worsened outcome. The influence of gender on the likelihood of suffering an ICH after treatment with tPA is not well studied, and conflicting data exist on this influence.

Objectives:

We sought to evaluate the rates of ICH and compare functional outcome by gender in patients treated with tPA in our ED.

Design/Methods:

We performed a retrospective study of patients presenting to our community hospital ED over a 44-month period (from January 2012 to September 2015) with symptoms of stroke who were treated with tPA. Outcomes were determined by medical record review, with ICH defined as radiographically identified hemorrhage, and favorable outcome as an mRS < 2.

Results:

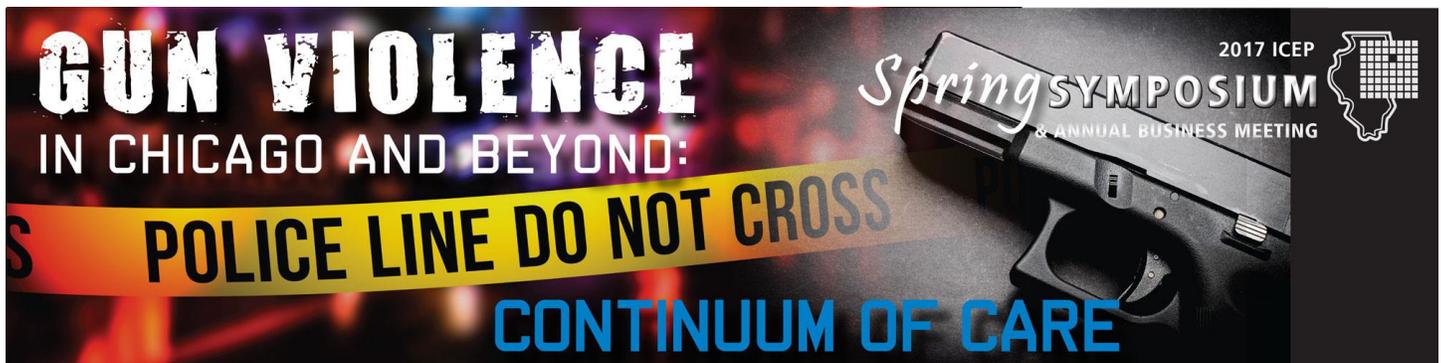
A total of 119 patients were treated over the study period, with a median age of 68 years (IQR 55 to 84), and a gender of 55% female. Median NIHSS score was 8 (IQR 4 to 14). A total of 14.8% of male patients and 10.8% of female patients suffered an ICH. Mortality was 9.3% for males and 7.7% for female patients. Median mRS at discharge was 4 (IQR 3.75 to 5) for males and 2 (IQR 0 to 4) for females. A total of 4 male patients (7.5%) and 25 female patients (38.5%) attained a favorable (mRS < 2) functional outcome. When controlling for age, and presenting NIHSS, gender did not significantly influence rate of ICH (OR 0.53, 95% CI 0.17 to 1.7), mortality (OR 0.44, 95% CI 0.10 to 2.0), or achievement of favorable functional outcome (OR 0.44, 95% CI 0.17 to 1.15).

Conclusions:

The incidence of ICH, as well as mortality and the attainment of favorable functional outcome varied by gender in our patient population, with female patients having more favorable findings than male patients; however, after controlling for age and presenting NIHSS, this difference did not demonstrate statistical significance.

Impact:

Gender has not been proven to be a significant factor in regards to outcome.



Impact of a Simulation-based Ongoing Professional Practice Evaluation on Provider Procedural Confidence in Five Rare Procedures

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Background

Evaluation of procedural skills of practicing Emergency Physicians (EPs) is a Joint Commission requirement known as the Ongoing Professional Practice Evaluation (OPPE). The authors have successfully implemented a simulation-based OPPE and now in its second year are seeking to study the effect of the experience on provider confidence in performing rare emergent procedures.

Objective

Aim one is to determine the frequency of rare procedures performed by practicing EPs in an academic medical center. Aim two is to measure procedural confidence before and after the simulated exercise and determine if the simulation-based OPPE increases confidence.

Methods

Study participants were board eligible or board certified practicing EPs from one academic institution. 19 of 34 eligible physicians have consented to take part in the study to date. Participants were asked to complete a pre-simulation survey measuring the number of procedures performed in the past year and their confidence in performing five procedures: central line catheter placement, cricothyrotomy, precipitous vaginal delivery, intraosseous line placement, and thoracostomy tube placement. During the OPPE session, participants were guided through simulation-based performance of each procedure. A follow-up survey was sent 2-4 weeks after the experience to each provider.

Results

Preliminary data (n = 19) shows that the median number of yearly procedures performed per provider were: central line - 4, cricothyrotomy - 1, precipitous, vaginal delivery - 0, intraosseous line placement - 2, thoracostomy tube placement - 1. Average confidence per procedure on a 5-point scale was: central line - 4.5, cricothyrotomy - 3.5, precipitous vaginal delivery - 3.2, intraosseous line placement - 4.6, thoracostomy tube placement - 4.1. Post survey results are currently being collected.

Conclusion

Offering the ongoing professional practice evaluation in a simulated environment using procedure trainers is one way to increase experience with rare procedures and also potentially improve confidence.

Impact

A simulation-based OPPE allows a way for physicians to demonstrate ongoing proficiency at rarely performed emergent procedures and allows the opportunity to refresh the manual dexterity required for such procedural skill.



Is It Ethical or Effective? Comparison Study of Porcine and Human Cadaver Models in Resident Training of Invasive Procedures

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Background:

Porcine models have been used for procedural training despite anatomical limitations and ethical concerns. The aim of this study was to compare live porcine versus human cadaveric models for teaching invasive procedural skills with EM and general surgery residents.

Methods:

Collaborating with 14 general surgery residents, 36 EM residents transitioned from a live porcine model to a human cadaver lab for procedural training. Procedures included needle and open cricothyroidotomy, needle pneumothorax decompression, emergency thoracotomy to include open cardiac massage and aortic cross-clamping, pericardiectomy, pericardiocentesis, intra-osseous needle insertion, knee and shoulder arthrocentesis, lateral canthotomy, and subclavian central line insertion. Residents evaluated the educational effectiveness of the live porcine compared to the human cadaveric models (Likert scale) through structured surveys and debriefing sessions. The residents also evaluated if the human cadaver was a suitable teaching model considering realism (Likert scale) and ethics. Educational effectiveness and ethics survey results were analyzed by two-tailed t-tests.

Results:

Educational effectiveness of the human cadaver had a statistically significant increase when compared to the porcine model for all procedures with rating improvements of 0.69 – 1.60 points on the Likert scale. Evaluation of ethical perspectives indicated greater concern in utilizing the porcine model ($p < 0.05$). 10% of surveyed residents reported the human cadaver as unethical or questionable while 23% reported the live porcine model as unethical or questionable. Additionally, realism of the human cadaver was reported with a mean of 3.66 (95%CI 3.64-3.68) amongst all procedures.

Conclusion:

These results demonstrate that residents report training on cadaver models superior to porcine models when learning invasive procedures. Human cadavers are a suitable substitute to the porcine model when evaluating educational effectiveness, realism, and ethics.



Emergency Radiology Utilization and Optimization

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Heather Kiernan, RN; Michael J. Schmidt, MD; Sanjeev Malik, MD;
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Background:

Emergency radiology is essential for rapid diagnosis and treatment of ED patients; a delay in imaging delays assessment of patients and prolongs their ED length of stay (LOS)ⁱ. Long ED waits are associated with adverse outcomes and poor patient experienceⁱⁱ. Reducing imaging turnaround time (TAT) has been proven to decrease ED LOSⁱⁱⁱ.

Objective:

A large, multi-story, Level I trauma, academic ED undertook a plan to reduce imaging TAT. We hypothesized that operational changes would achieve goals of 30 min median order-to-perform for both X-Ray & non-contrast CT TAT.

Design/Methods:

Traditional process improvement (PI) methods (root cause analysis and LEAN methodology) identified patient preparation, transportation, and radiology staff scheduling as key drivers of inefficiency. Radiology assistant techs were hired to support communication and transportation functions, and radiology staffing was aligned with peak demand.

Nonetheless, at peak times demand on our single CT scanner exceeded capacity by 2 orders/hour. Geographic proximity was identified as a limiting factor: prior data at our institution demonstrated that 2nd floor ED patients had TATs 40 min longer than patients in closer geographical proximity to a CT scanner. This favored the addition of a decentralized radiology suite, which was added to the 2nd floor.

Results:

In FY16 Q4 compared to FY15 Q4 baseline, 30 min TAT goals were achieved for both X-Ray & non-contrast CT. Average X-Ray TAT improved by 20 min (95%CI 19-21) and non-contrast CT by 43 min (95%CI 41-46). Average ED LOS improved by 34 min (95%CI 29-39) and LWBS % by 1.7 points (95%CI 1.4-2.0).

Conclusion:

PI methods can improve inefficient ED radiology processes, but to achieve further gains comprehensive analyses must identify and rectify unique limitations. The addition of decentralized radiology capacity was a necessary solution to the challenges of a two-level ED. Seasonal confounding was controlled, however the continuous operational improvement cycle limits observational studies in the ED.

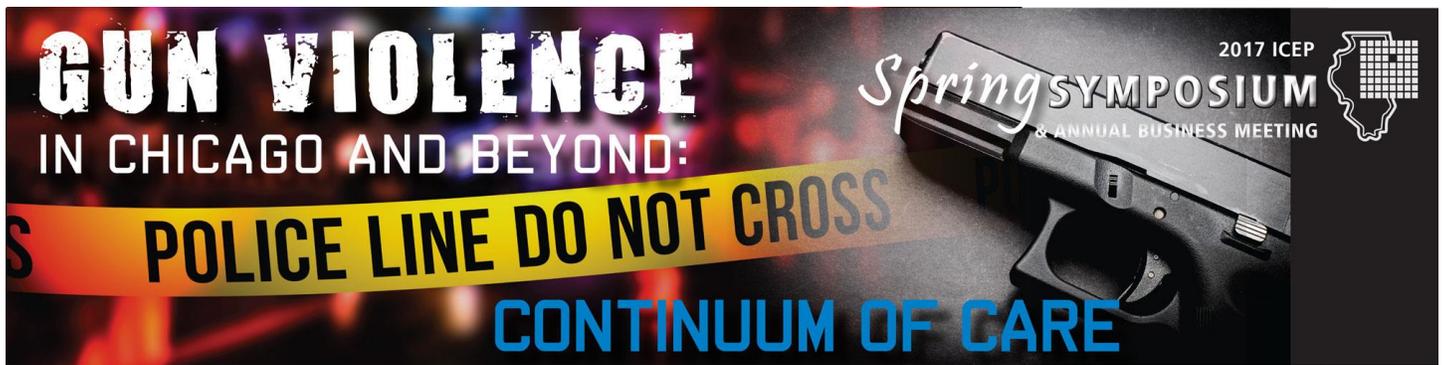
Impact:

This study reveals the gains and limitations of PI methods and the utility of comprehensive resource use analysis in order to decrease radiology TAT. These methods have the potential to improve ED operational metrics valued by leadership, including ED LOS and LWBS.

ⁱ The management of emergency radiology: Key facts. Miele, Vittorio et al. European Journal of Radiology, Volume 59, Issue 3, 311 - 314

ⁱⁱ Bursch B, Beezy J, Shaw R. Emergency department satisfaction: What matters most? Ann Emerg Med. 1993;22:586-591.

ⁱⁱⁱ Emergency Department CT Expediency: A Time Reduction by Redesign. Rigual, David et al. Journal of the American College of Radiology, Volume 13, Issue 2, 178 - 181



Improving Clinical Information on Head CT Requisitions from the Emergency Department to Aid Interpretation and Billing Efficiency

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The University of Chicago, Chicago, IL

Background/Objective:

Accuracy of radiological interpretations is higher when appropriate clinical information is provided, as is the likelihood of reimbursement for the studies. The purpose of this project is to evaluate and improve the quality of clinical information provided on CT head requisitions from an urban Emergency Department.

Design/Methods:

Study was prospectively conducted from July 2015 to May 2016. 1100 randomly selected CT head requisitions from the ED were evaluated by attending neuroradiologists for clinical and billing adequacy on a scale of 0-2. After obtaining baseline data (400 studies), an intervention was performed consisting of education to ED faculty on the importance of clinical information on requisitions. A reminder slide was also placed on a large screen in the ED staff working area with examples of appropriate history. Post-intervention data (700 studies) was subsequently obtained. Mean scores and payment lag time pre- versus post-intervention were compared using the Wilcoxon-rank-sum test.

Results:

There was a statistically significant improvement in mean scores following intervention for both clinical (1.32 to 1.43, $p=0.003$) and billing (1.64 to 1.74, $p=.02$) adequacy categories. The percentage of studies with score of '2' increased for both categories, while the percentages of '0' and '1' scores declined. There was a 21.1-day decrease in payment lag time (from 75.8 to 54.7 days, $p<.0001$).

Conclusion:

We demonstrate improvement in clinical information provided on requisitions by ED faculty and residents following a relatively simple intervention. There was also associated improvement in billing efficiency.

Impact:

The impact of this quality improvement project is threefold: 1.) continued interventions might result in further improvement in imaging requisitions. 2) Our quality improvement project might have ultimately improved hospital efficiency by improving our ability to provide accurate radiology interpretations and improving billing turnaround time and 3.) Similar QI projects might be expanded to other imaging modalities such as CT abdomen/pelvis and to other institutions.