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Plenary presentations

The best in Canadian EM research

Winner of the Grant Innes Research Award

1

A PROSPECTIVE, blinded, randomized controlled trial to evaluate ketamine-propofol v. ketamine alone for procedural sedation in the pediatric emergency department

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Introduction: Propofol (P) and Ketamine (K) are commonly used as single agents for emergency department (ED) procedural sedation. Studies have suggested that the combination of K and P may be an effective alternative to either agent alone. There are no prospective studies of this combination in pediatric EDs. **Objective:** To compare time to recovery, total sedation time, complications, adverse events and satisfaction scores when Ketamine-Propofol (KP) is used compared to K for pediatric ED procedural sedation. **Methods:** This trial included children (2–17 years) presenting to a pediatric academic ED requiring procedural sedation for management of an isolated orthopedic extremity injury. Patients were randomized to KP or K. Physicians, nurses, research assistants and patients were all blinded. KP patients received an initial dose of K 0.5 mg/kg and P 0.5 mg/kg IV at time zero, followed by P 0.5 mg/kg and saline placebo every 2 minutes as needed to reach a predetermined sedation score. K patients received an initial dose of K 1.0 mg/kg and intralipid placebo IV, followed by K 0.5 mg/kg and placebo every 2 minutes as required. **Results:** 136 patients (67 KP, 69 K) were enrolled (June 2007–August 2008). Mean recovery time was faster in the KP group (11.4 min; 95% CI 10.2–12.7) v. the K group (15.6 min; 95% CI 12.8–18.3). Total sedation time was also shorter in the KP group (15.2 min; 95% CI 13.6–16.8) compared to the K group (18.7 min; 95% CI 15.8–21.6). 8/67 patients in the KP group experienced adverse events (nausea/vomiting, emergence reaction) compared to 21/69 to the K group ($p < 0.01$). Complications were not different between groups (KP 9/67, K 12/69). All sedation satisfaction scores were higher ($p < 0.05$) in the KP group. **Conclusion:** Ketamine-Propofol is an effective method of pediatric sedation, providing more rapid recovery than Ketamine alone, with similar complication rates, less adverse events and higher satisfaction scores. **Keywords:** procedural sedation, randomized controlled trials, pediatrics

2

THE FAILURE of discharge spirometry cut-points to predict relapse after discharge from the emergency department with acute asthma

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Introduction: Spirometric measurements in acute asthma are advised to guide decisions regarding emergency department (ED) discharge. CAEP guidelines suggest discharge only after 70% predicted is reached. Despite some contradictory evidence, previous research suffers from a lack of standardized out-patient therapy and poor outcome definitions. This study provided standardized anti-inflammatory treatment to all patients (pts) at discharge and a well defined outcome to examine the diagnostic test characteristics of spirometric measurements in acute asthma. **Methods:** A controlled trial was conducted in 16 Canadian EDs. Pts with physician diagnosis of asthma, age 18–55, and no evidence of COPD were approached if they met the treating physician's discharge criteria. All pts provided consent and underwent a structured ED interview and follow-up telephone interview 4 weeks later. At discharge all pts received 7 days of pred-

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nisone (50 mg orally daily) and a prescription for inhaled corticosteroids (ICS) was advised. Relapse was clearly defined and adjudicated centrally and compared to various cut-points using sensitivity (sens), specificity (spec), likelihood ratios (LR) and area under the curve (AUC) in receiver-operating curves (ROC). **Results:** A total of 788 pts were enrolled; median age was 29 yr and 435 (55%) pts were women. Overall, 112 (14%) pts relapsed (unscheduled visit for perceived worsening respiratory symptoms). The CAEP cut-point of 70% predicted FEV1 produced the following: sens = 35.5%, spec = 80.1%, + LR = 2.06 and –LR = 0.85. A cut-point of > 60% predicted FEV1 produced the following: sens = 25.8%, spec = 87.5%, + LR = 1.78 and –LR = 0.85. Using all values for % predicted FEV1, the AUC was 0.54. **Conclusion:** The psychometric properties of discharge FEV1 do not meet current test threshold for usefulness. Emergency physicians should not rely on single measures of post-treatment spirometry for discharge decision-making. Other nontreatment factors associated with relapse should be explored. **Keywords:** asthma, spirometry, asthma relapse

3

TRIAL of routine angioplasty and stenting after fibrinolysis to enhance reperfusion in acute myocardial infarction (TRANSFER-AMI)

Borgundvaag B, Cantor WJ, Fitchett D, Heffernan M, Cohen EA, Morrison LJ, Ducas J, Langer A, Mehta S, Lazzam C, Schwartz B, Dzavik V, Casanova A, Singh P, Goodman SG, for the TRANSFER-AMI Investigators; Mount Sinai Hospital, Toronto, ON

Introduction: Patients who present with ST-elevation myocardial infarction to hospitals without percutaneous coronary intervention (PCI) often cannot undergo primary PCI in a timely manner and therefore receive fibrinolysis. The role and optimal timing of routine PCI after fibrinolysis, using contemporary stents and pharmacotherapy, has not been well studied. **Objective:** To compare a pharmacoinvasive strategy of transfer for routine PCI within 6 h after fibrinolysis with standard treatment after fibrinolysis (including predefined criteria for rescue PCI). **Methods:** Patients presenting to non-PCI centres with STEMI < 12 h from onset and with high-risk features were randomized to a pharmacoinvasive strategy (transfer for PCI within 6 h of fibrinolysis) or standard treatment after fibrinolysis (which included rescue PCI as required for ongoing chest pain and < 50% resolution of ST-elevation at 60–90 min). For standard treatment pts not requiring rescue PCI, cardiac catheterization was encouraged > 24 h. All pts received ASA and antithrombin therapy (unfractionated heparin or enoxaparin for age < 75 yr); use of upfront clopidogrel was strongly encouraged; all other therapies were left to the discretion of the treating physician. The primary endpoint was the 30-day composite of death, reinfarction, recurrent ischemia, heart failure or shock. **Results:** 1059 patients were enrolled as of December 31, 2007. At 30 days, the primary endpoint was significantly lower with the pharmacoinvasive strategy (11.0% v. 17.2%, p = 0.002), with no difference in major bleeding complications. This study is the largest randomized trial to date comparing a pharmacoinvasive strategy with standard care after fibrinolysis. **Conclusion:** Urgent transfer and PCI within 6 hours after fibrinolysis is associated with significantly lower ischemic complications at 30-days and no excess in major bleeding. Transfers to PCI centres should be initiated immediately after fibrinolysis without waiting to see whether reperfusion is successful. **Keywords:** ST-elevation myocardial infarction, pharmacoinvasive strategy, percutaneous coronary intervention

4

EARLY CT without LP reliably excludes subarachnoid hemorrhage in neurologically intact ED patients with acute headache

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Introduction: It is widely recommended that acute headache patients undergo lumbar puncture (LP) to rule out subarachnoid hemorrhage (SAH) even after normal computed tomography (CT). Our objective was to determine the sensitivity of modern CT scans for SAH overall and when done < 6 hours from headache onset in ED patients with normal neurological exam. **Methods:** This prospective cohort study was conducted at 12 university EDs. Patients ≥ 15 years, with normal neurological exam, GCS 15, and a complaint of a nontraumatic, acute (< 1 h from onset to peak) headache investigated with a CT were enrolled over 8 years. Physicians completed data forms prior to work-up. The outcome criterion, SAH, was defined by any of: 1) SAH on CT, 2) xanthochromia in the cerebrospinal fluid (CSF), or 3) red blood cells in the final tube of CSF with positive cerebral angiography. Patients without both a normal CT and LP had 6-month structured telephone follow-up. Analysis included sensitivity with corresponding 95% confidence intervals. A preplanned subgroup analysis was performed for patients with CT scan < 6 hours from onset of headache. **Results:** There were 3123 enrolled patients including 234 with SAH. 80.3% of eligible patients were enrolled. Mean age was 45.1 years (SD 17.2) with 60.2% female. Overall sensitivity of CT for SAH was 93.1% (95% CI 89–96%). Of the 960 patients with CT performed < 6 hours from headache onset, 124 had SAH. The sensitivity of CT for SAH in this group was 100% (95% CI 97–100%). Of 401 LPs performed in this subgroup with a negative CT, 0 demonstrated xanthochromia and 128 had red blood cells > 5 × 106/L and 305 patients underwent angiography (all negative for aneurysm, except 1 where aneurysm seen on CT without SAH). **Conclusion:** This large prospective study of neurologically intact patients found that CT alone is highly sensitive for SAH when performed < 6 hours from headache onset. When done within 6 hours of headache onset, CT alone is sufficient to exclude SAH, rendering LP unnecessary. **Keywords:** headache, subarachnoid hemorrhage, neuroimaging

Oral presentations

5

RELIABILITY of a structured interview for admission to an emergency medicine residency program

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Introduction: Personal interviews are regarded as the most important screening tool in resident selection. Structured interviews (SI) are more reliable than unstructured ones. The content of a SI reflects the dimensions of performance felt to be necessary to succeed in a particular line of work. As a rule, a job analysis is conducted to determine these dimensions. In 2006, a job analysis was performed using the critical incident technique to extract the dimensions of performance essential to succeed as a resident in emergency medicine. A SI was designed based on these dimensions. This study aims at measuring the interrater reliability of the SI tool during the selection process to our emergency medicine residency program. **Methods:** The interview tool comprised 7 clinical scenarios, rated on a 5-point anchored Likert scale, and one global assessment, rated on a 10-point scale. Candidates were presented with the scenarios and asked for their approach or the rationale for their decision. 3 trained inter-

viewers marked each candidate on all scenarios without discussing candidates' responses. Estimates of variance were computed for the 7-scenario tool and for the overall rating. Interitem consistency was measured for the 7-question instrument. **Results:** 28 candidates were interviewed. The generalizability coefficient was 0.67 (95% CI 0.46–0.74). To achieve a reliability of 0.75 and 0.80 with 3 interviewers would require 12 and 20 scenarios respectively. Removing the central tendency ratings increased the coefficient to 0.74. The G-coefficient for the overall rating was 0.89 (95% CI 0.86–0.96). Coefficients of inter-item consistency ranged from 0.64 to 0.74. **Conclusion:** The SI tool provided good although suboptimal interrater reliability. Increasing the number of scenarios and applying differential weights to the rating scale anchors would raise the reliability of the SI tool to levels acceptable for high-stake decisions. The latter would also facilitate the identification of those candidates with extreme ratings. **Keywords:** structured interviews, resident selection, admission criteria

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DIFFERENCES between men and women with acute asthma discharged from the emergency department after acute asthma

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Introduction: Evidence suggests women with acute asthma presenting to the emergency department (ED) receive less aggressive treatment and may respond differently than males. While due to multifactorial influences, body mass, hormones, and steroid resistance are proposed causes. Previous research suffers from a lack of standardized therapy and barriers to care. We examined outcomes following standardized care for acute asthma in a universally accessible health care system. **Methods:** A controlled trial was conducted in 16 Canadian EDs. Patients (pts) with physician diagnosis of asthma, age 18–55, and no evidence of COPD were approached if they met physician-based criteria for discharge. All pts underwent a structured ED interview and follow-up telephone interview 4 weeks later. At discharge all pts received 7 days of prednisone (50 mg orally daily) and a prescription for inhaled corticosteroids (ICS) was advised. This analysis examines the differences between men and women in this cohort using χ^2, *t* test, K-W test, as appropriate. **Results:** Of 788 pts enrolled, 453 (57%) subjects were women. Women were older (31 v. 27 years), less often single (39% v. 53%), less often employed (44% v. 66%) and more often had a family physician (86% v. 74%; all $p < 0.0001$). Other demographic and chronic features were similar; however, more women were taking ICS prior to the ED (73% v. 61%; $p < 0.0001$). Treatment in the ED was similar for corticosteroids (98% v. 97%) and beta-agonists (61% v. 59%)/anticholinergics (67% v. 68%) in the first hour. Final FEV1 was higher in women after treatment although % change was similar. Relapse was more common in women (18% v. 9%; $p = 0.001$) following discharge. **Conclusion:** Minor differences were observed between women and men with acute asthma in the ED. Despite standardized in- and outpatient treatment, women had nearly twice the number of relapses after discharge. Women with acute asthma should be considered at risk for relapse and focused research in women should be encouraged. **Keywords:** asthma, asthma relapse, gender differences

7

IS leaving the ED without being seen associated with an increased risk of adverse events when compared with comparable patients who are seen in the ED and discharged home?

Guttman A, Schull MJ, Stukel TA, Fung K; Sunnybrook and Women's College Health Sciences Centre, Toronto, ON

Introduction: Emergency department (ED) patients who leave without being seen (LWBS) are at risk of adverse events, yet the extent to which these differ from comparable patients who are seen in the ED is unknown. **Methods:** Using administrative databases from all higher volume (average annual volume > 25th percentile) EDs in Ontario, Canada, over 1 year (2006–2007), we linked records of ED visits, hospitalizations and deaths of LWBS patients and those seen and discharged (SAD) by an ED physician. ED admissions and transfers were excluded. We analysed whether LWBS v. SAD status was associated with adverse events (hospitalization or death) in the subsequent 7 days adjusting for age, sex, socio-economic status, rurality, triage acuity, chief complaint, and frequency of prior ED visits. GEE analysis was used to account for clustering at the hospital level. **Results:** There were 181 117 LWBS and 3 986 740 SAD visits, adverse event rates were 1.8% ($n = 3297$) and 2.1% ($n = 81\,864$) respectively. Independent predictors of adverse events included age (e.g. age < 1 yr OR 1.47, 95% CI 1.41–1.54; age > 65 yr OR 2.75, 2.65–2.85; v.18–39 yr), triage acuity (high acuity OR 1.40,1.37–1.44; low acuity OR 0.53, 0.51–0.55; v. medium acuity), number of previous ED visits (none OR 0.66, 0.65–0.67; 1 OR 0.73, 0.72–0.75; 2 OR 0.81, 0.80–0.82; v. ≥ 3) and chief complaint group (e.g., injury OR 0.31, 0.29–0.34 v. abdominal complaint). LWBS status was not an independent predictor of adverse events when compared with SAD status, OR 1.03, 0.99–1.07, $p = 0.14$. **Conclusion:** LWBS status was not associated with an increased risk of hospitalization or death at 7 days in a large study controlling for important demographic and clinical predictors, when compared with ED patients who are seen and discharged home. Patient safety programs targeting LWBS patients for review and/or follow-up may be of limited utility given that adverse events appear similar in patients who are seen and discharged by an ED physician. **Keywords:** left without being seen, adverse events, administrative database

Winner of the CAEP Medical Student Research Abstract Award

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PRESCRIPTION errors detected and corrected by pharmacy service in the ED

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Introduction: Emergency departments (EDs) are recognized as high risk settings for prescription errors. Pharmacy involvement in the ED is an important resource that provides assistance in reviewing, identifying and correcting prescribing errors. This study's objective is to describe the frequency and type of prescription errors detected and corrected by the pharmacy service in the ED, and to identify factors related to prescription errors. **Methods:** Prospective observational study conducted in a tertiary teaching hospital ED in Montréal for 25 consecutive weekdays (Nov. 17–Dec. 19, 2008). The average ED visits was 180/day. All ED prescriptions were reviewed and validated by the pharmacy service (a pharmacist + a technician) operating weekday day shifts (8:00–16:00). The pharmacy service practice is to flag and correct prescription errors for patients in the ED. Data collection involved the extraction of all errors and their correction from the ED prescription sheets. Patient demographic information was obtained through the ED administrative database. **Results:** In total, 3105 prescriptions (11 541 medications) were collected, with 103 (3.3%) errors identified. The most frequent type of error is wrong dose ($n = 28$; 27%), followed by incomplete prescription ($n = 21$; 20%), wrong drug ($n = 16$; 16%) and wrong frequency ($n = 16$; 16%). According to different shifts (day–evening–night), the percentages of prescriptions prescribed are 33%–40%–27%, errors identi-

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fied are 21%–51%–28%, and errors corrected are 69%–88%–50%. Multiple logistic regression analysis showed (OR; 95% CI) that elderly age 65 + (2.9; 1.3–6.4), emergency residents (3.0; 1.6–5.3) and number of medications prescribed (1.19; 1.14–1.24 for each additional drug) are associated with increased risk of prescription errors. **Conclusion:** The ED pharmacy service operating only during the day shift identified and corrected the majority of prescription errors. More prescription errors occurred with older patients, when prescribed by emergency residents and when many medications were prescribed. **Keywords:** emergency pharmacist, medication errors, cohort study

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ELECTRONIC selection of EMS destination to enhance capacity and flow management

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Introduction: Regional Emergency Patient Access and Coordination (REPAC) is a Calgary-wide database that moniters real-time emergency department (ED) census and acuity mix, including expected EMS arrivals and patients awaiting admission or consultation. REPAC continuously categorizes each ED status as green, yellow, orange, or red with respect to ability to receive incoming EMS patients. Green status suggests available capacity with minimal operational delay, while red status indicates extreme capacity challenge. Based on site status, REPAC prioritizes EMS destination for each patient in order to match regional ED inflow with site capacity. Patients requiring services isolated at a specific site attend accordingly, regardless of color status. Our hypothesis was that proactive EMS inflow balancing would enhance regional ED capacity and flow management. **Methods:** This study compared 2 equivalent 9-week periods immediately before and after REPAC destination prioritization began on October 8, 2008. Regional ED visits, total EMS transports, CTAS acuity distribution, EMS arrival distribution and site avoidances were documented hourly. Primary outcomes were number of EMS site avoidances during the study period and proportion of time in favorable (green/yellow) v. unfavorable (orange/red) status for the 3 adult EDs (FMC, PLC, RGH). **Results:** Study periods were similar for volumes and acuity. Proportion of time in favorable status improved at FMC (48.8% to 63.4%), RGH (55.8% to 75.8%), PLC (55.9% to 68.9%) and regionally (53.5% to 69.4%; $p < 0.0001$ for all). EMS avoidances decreased at FMC (72 to 30), RGH (20 to 4) and PLC (10 to 4). Total regional site avoidances decreased from 102 (95% CI 83–124) to 38 (95% CI 27–52), a statistically significant and clinically important difference. **Conclusion:** Proactive EMS destination selection and inflow balancing using a real-time integrated electronic capacity surveillance system reduces ambulance site avoidance and enhances regional capacity and flow management. **Keywords:** emergency medical services, ED crowding, flow management

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ASSOCIATION between emergency department triage and outcomes for acute myocardial infarction patients

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Introduction: Medical and interventional therapies improve outcomes for acute myocardial infarction (AMI) patients. The extent to which ED processes of care affect outcomes is unclear. **Objective:** To determine variations in AMI outcomes across high volume hospitals and assess whether initial ED triage assessment and hospital cardiac management are associated with improved outcomes. **Methods:** Population-based longitudinal cohort study of 98 115 adults hospitalized with first episode of AMI in a high-volume Ontario hospital (> 50 annual AMI admissions) during 2000–2006 and followed for up to 1 yr, according to hospital-level cardiac management markers: appropriate ED triage (rate of high acuity triage assignment), intensity of interventional (30-d cardiac catheterization rate) and medical (discharge statin prescribing rate) therapy. Outcomes were all-cause mortality (30 d, 1 yr), AMI readmissions or mortality, and major cardiac events (readmission for angina, AMI, or heart failure or death) within 6 months. **Results:** 30-day risk-adjusted mortality varied 5-fold (4.1%–20.8%) and major cardiac event rates varied 4-fold (0.17–0.60/person-year) across hospitals in 2006. Median hospital-level high-acuity triage was 71.1% (IQR 61.3–80.6). Patients admitted to hospitals with the highest v. lowest rates of combined medical and interventional management had lower rates of 30-day mortality (adjusted relative rate (aRR) = 0.84, 95% CI 0.78–0.91), AMI readmissions (aRR = 0.71, 0.66–0.75) and major cardiac events (aRR = 0.61, 0.58–0.64). Each 10% increase in hospital rate of appropriate ED triage was associated with a 2% decrease in 30-day mortality (aRR = 0.98, 0.97–0.99). **Conclusion:** AMI outcomes vary widely across Ontario hospitals, and better outcomes are associated with higher hospital rates of appropriate ED triage, and both medical and interventional management. Strategies that promote better ED triage and inpatient management of AMI patients could improve care and outcomes at all hospitals. **Keywords:** acute myocardial infarction, triage, cohort study

Winner of the CAEP Resident Research Abstract Award

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PROPHYLACTIC hypothermia for severe traumatic brain injury: a quantitative systematic review

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Introduction: Recent evidence supports the use of hypothermia for traumatic brain injury (TBI) but has not been included in any systematic review. Studies fall into 2 broad categories: those with fixed, short term cooling protocols (e.g. 24 h–48 h), and those that cool for longer periods of time and/or terminate based on the normalization of intracranial pressure (ICP). Our objective was to perform a quantitative systematic review of all RCTs of therapeutic hypothermia versus standard care for patients with severe TBI. **Methods:** A comprehensive search strategy was developed a priori. We searched EMBASE, MEDLINE, Web of Science, the Cochrane Central Register of Controlled Trials, ProceedingsFirst, and PapersFirst. Additional articles were identified by handsearching conference proceedings and bibliographies. Studies were selected and divided into short and long term groups by 2 reviewers using explicit criteria. Our approach and analysis followed the recommendations of the Cochrane Group. **Results:** Of 1709 articles, 13 met the inclusion criteria and were selected for quantitative analysis. Nine studies used a long-term or goal-directed cooling strategy, and 4 used a short-term strategy. Pooling the results from all studies resulted in a relative risk of mortality of 0.72 (95% CI 0.62–0.85) and risk of a good outcome (Glasgow Outcome Scale of 4 or 5) of 1.53 (95% CI 1.30–1.80). There was no statistically significant mortality benefit seen in the 4 short-term studies. The 9 long-term studies indicated a striking benefit: relative risk of mortality = 0.62 (95% CI 0.51–0.75) and relative risk of good outcome = 1.69 (95% CI 1.45–1.97). **Conclusion:** Early prophylactic hypothermia, especially when carried out beyond 3 days, confers a significant benefit on mortality and functional outcome for patients with severe TBI. **Keywords:** prophylactic hypothermia, traumatic brain injury, systematic review

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A SIMULATION-based training intervention to optimize air medical scene trauma management

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Introduction: Critically injured patients may be better served by focused scene care to expedite transport to definitive care. We evaluated air-medical provider performance in managing simulated scene trauma patients before and after a focused training intervention. **Methods:** A before–after simulation trial of flight team providers of a Level 1 trauma centre. Subjects were randomized to 1 of 2 high fidelity simulator scenarios (adult or pediatric) scripted from actual trauma calls. Simulation was carried out in a training ambulance. Reviewers evaluated simulator logs and video and scored subjects on a patient management inventory. Primary outcome, air-medical scene care interval, was measured from opening to closing of the rear doors of the ambulance. Subjects reviewed their personal scenario recordings and provided suggestions to optimize scene trauma care via an online survey. Recommendations regarding crew configuration, procedures, equipment, and medications, were addressed in a comprehensive training intervention. Subjects were randomized to postintervention scenarios. Analysis was descriptive. **Results:** The 22 flight providers had the following characteristics: male 64%, EMT-P 45%, RN 63%, mean experience 9.5 years, mean scene traumas in prior 6 months 4.1. Data was available for 21 before (11 adult, 10 pediatric) and 19 after (11 adult, 8 pediatric) scenarios. Providers performed a greater number of critical elements after the intervention for both adult (24 to 27; $p = .0243$) and pediatric (14 to 18; $p = .0452$) scenarios. The postintervention mean scene care interval decreased (11.4 to 7.4 min; $p = .0133$) largely due to improved efficiency in the adult scenario (15.4 to 8.4 min; $p = .0009$). The pediatric scene care interval had a downward trend (7.0 to 5.7 min; $p = .379$). **Conclusion:** A novel training program utilizing simulation to identify barriers in air-medical scene trauma patient assessment and management resulted in improved performance and a reduction in scene times in the prehospital simulator. **Keywords:** simulation, air-medical transport, trauma

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TOPICAL vapocoolant versus placebo for vaccination in infants and young children

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Introduction: Vapocoolants are aerosols applied to the skin or intact mucous membranes, and instantly create a cooling effect on the surface by immediate evaporation of the product. Our objective was to determine if a vapocoolant reduces pain compared to placebo in infants and young children undergoing routine immunization. **Methods:** Prospective, randomized, double blind, placebo controlled trial in a Pediatric community clinic in a large urban area in Canada. Of 66 families approached, 2 declined participation and 1 was excluded as he did not undergo vaccination. Thirty-one (49%) were recruited to the vapocoolant group and 32 to the control group. Either vapocoolant or a placebo were administered to the area of immunization using a cotton ball. Children were videotaped and their films were scored by a blinded observer. The primary outcome measures were the Modified Behavioural Pain Scale (MBPS) and Faces Pain Scale-Revised (FPS-R). We also measured parental perception of the treatment. **Results:** The median difference MBPS score (injection–baseline) did not differ between groups ($p = 0.66$). There was also no significant difference in the observer FPS-R scores or in parental assessments of the benefits of the study intervention between the 2 groups. The interobserver intraclass correlation on 39 children's videotapes was 0.93 ($p < 0.001$). **Conclusion:** Vapocoolant did not reduce pain during immunization in infants and young children when applied using a cotton ball. We suggest that future studies will further assess vapocoolants in the young age group in order to determine if direct application using a spray is beneficial to reduce pain from immunization. **Keywords:** vapocoolant, vaccination, pediatrics

14

AN EMERGENCY department sepsis protocol is associated with sustained mortality benefit at 2-year follow-up

Stenstrom R, Grafstein E, MacRedmond R, Dodek P, Helmich E, Hollohan K, Nebre R, Innes G, Scheuyermeyer F, Hunte G, Harris D, Christenson J, Poureslami I; St Paul's Hospital, Department of Emergency Medicine, Vancouver, BC

Introduction: Early recognition and treatment of sepsis with an emergency department (ED) protocol has been shown to decrease 28 day mortality. We introduced a sepsis protocol consisting of early recognition, rapid antibiotics and IV fluids, rapid central line placement, and early goal directed therapy started in the ED, in July 2005. We hypothesized that the survival benefit would be maintained for 2 years. **Methods:** In an urban tertiary care ED with 60 000 patient visits per year a standardized, evidence-based protocol was adopted in July 2005 for all patients diagnosed with sepsis (infection and 2 or more SIRS criteria). The primary outcomes were death from any cause and time to death. We compared mortality rates at 28, 60, 120 days and 1 and 2 years in patients admitted to the ICU with a diagnosis of severe sepsis (sepsis and 1 or more organ failure) or septic shock (SBP < 90 mm Hg after 20 mL/kg fluid bolus) before and after the implementation of the protocol. All cause mortality and date of death was ascertained by linkage with the provincial vital statistics database. A total of 164 patients were randomly selected (77 before and 87 after protocol patients) who went to the ICU from the ED with severe sepsis or septic shock were followed for at least 2 years. Outcome data were ascertained for all patients. **Results:** The potocol and preprotocol patients were similar for age, gender distribution, severity scores, and baseline lactate level ($p > 0.10$ for all). 28 day mortality was 43.5% in the preprotocol group and 24.4% in the protocol group. 2-year mortality was 51.8% and 32.2% respectively in the preprotocol and protocol groups. Comparison of the Kaplan–Meier survival curves using the log-rank statistic showed a significant sustained benefit of the sepsis protocol ($p < 0.01$). **Conclusion:** Implementation of an ED sepsis protocol demonstrated a sustained, 2-year mortality benefit in patients with severe sepsis and septic shock. **Keywords:** sepsis protocol, knowledge translation, septic shock

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ED-based secondary prevention programs for youth violence: should they be based at trauma or nontrauma centres?

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Introduction: Victims of violence are more likely to become repeat victims with the first injury often a minor assault. ED-based secondary prevention initiatives have been proposed to help break the cycle of violence for these youth. Trauma centres, by nature of their designation, are often charged with the responsibility of developing these prevention initiatives. We hypothesize that the majority of youth who are injured by violence are treated in nontrauma centres. Given our goal is to prevent recurrent injury, trauma centre-based initiatives may be misdirected. **Methods:** We used a retrospective population-based cohort study design to evaluate the type of facility (trauma centre v. nontrauma centre) where injured youth (aged

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15–24) presented for assessment following intentional injury. The National Ambulatory Care Reporting System (NACRS) database was used to identify all subjects over the years 2002–2004. Intentional injury was determined through e-codes and hospital identifiers were linked to trauma centre status by the Canadian Institute for Health Information (CIHI). **Results:** The cohort included 27 986 patients. The mean age was 19.4 years and 80% were male. Eighty-three percent of youth injured by violence were treated at nontrauma centres v. 17% at nontrauma centres. Ninety-one percent of patients at nontrauma centres were discharged v. 84% of patients treated at trauma centres ($p < 0.001$). Patients with gunshot wounds ($n = 15$) and stab wounds (1960) were more likely to present to trauma centres; however less severe injuries such as assault by bodily force ($n = 24\ 429$) were more likely to present to nontrauma centres ($p < 0.0001$). **Conclusion:** Given the vast majority of patients are not seen at trauma centres, any prevention initiatives located here will not achieve the goals of preventing recurrent injury on a population basis. Secondary prevention initiatives should be implemented and evaluated in nontrauma centres. **Keywords:** youth violence, trauma centres, secondary prevention

Winner of the CAEP Resident Research Abstract Award

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PREHOSPITAL intubation and traumatic brain injury: a systematic review

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Introduction: Prehospital intubation is commonly performed in patients with a GCS ≤ 8. Our objective was to conduct a systematic review on the impact of prehospital intubation on mortality and neurologic outcome in patients with moderate to severe traumatic brain injury. **Methods:** Inclusion criteria for the review were; 1) patients suffered from a moderate or severe traumatic brain injury (GCS ≤ 8 and/or head abbreviated injury score ≥ 3); 2) compared patients that underwent prehospital intubation to patients that underwent ED intubation; and 3) included mortality or neurologic status (Glasgow Outcome Scale) outcomes. Two authors indepedently assessed study eligibility and methodological quality. Search included; MEDLINE, EMBASE, CINAHL and Cochrane Central Trial Registry (up until December 1, 2008), Emergency Medicine and Prehospital Care conference proceedings (2004–2008) and hand-searching of all references. We used the Ottawa–Newcastle scale to assess methodological quality of included studies. **Results:** From the above sources, 1781 articles were identified, 10 of which met inclusion criteria. All of the studies were observational and 3 were prospective. Nine studies addressed the primary outcome (mortality) and 3 studies included neurologic outcome data. Because of significant clinical, methodological, and statistical heterogeneity, performing a meta-analysis on the mortality or neurological outcomes was deemed inappropriate. However, essentially all studies and all subgroups demonstrated worse outcome with prehospital intubation. **Conclusion:** The results of the studies in this systematic review suggest that patients with traumatic brain injury who undergo prehospital intubation have worse outcomes. The current studies are unable to provide conclusive evidence that the intervention (prehospital intervention) is responsible for this outcome. Rigorous prospective studies are needed to determine whether the worse outcomes are a function of patient selection, the prehospital intubation or the manner in which it is performed. **Keywords:** prehospital intubation, traumatic brain injury, systematic review

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WHAT is the prevalence of methicillin-resistant *Staphlococcus aureus* in skin and soft tissue infections presenting to the emergency departments of a Canadian academic health care centre?

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Introduction: The objective of this study was to estimate the city-wide prevalence of Methicillin-resistant *Staphylococcus aureus* (MRSA) in adult patients (> 17 yr) presenting with skin or soft tissue infections (SSTIs) to the emergency departments (EDs) of a Canadian academic tertiary care centre. A secondary objective was to determine variables associated with MRSA and antimicrobial susceptibilities of MRSA. **Methods:** This prospective observational study was conducted in 3 EDs (combined annual volume 150 000) located in London, Ontario. A convenience sample of patients presenting with acute SSTIs from July to August 2008 were enrolled. Each participant completed a health and lifestyle questionnaire and predictor variables independently associated with MRSA were determined by multivariable general linear regression. Culture and sensitivity swabs of the infection site, nares, and throat were obtained and MRSA isolates were confirmed by polymerase chain reaction. **Results:** Of the 205 patients enrolled, 35 (17.1%) were infected with or were carriers of MRSA. Of MRSA positive patients (MRSA +), 6 (17%) were found to be colonized with MRSA in the nares, throat or both. Fourteen (40%) patients were found to be MRSA + on wound culture only, 8 (23%) patients were MRSA + on nares and wound swabs, 1 (3%) patient was MRSA + on throat and wound culture and 6 (17%) patients were found to be MRSA + in all 3 sites. Patient age, homelessness, incarceration and known exposure to MRSA were found to be significant predictors ($p < 0.05$) of MRSA SSTIs and colonization. Antimicrobial susceptibility among MRSA + wound swabs was clindamycin 77%, erythromycin 7%, gentamicin 100%, oxacillin/cloxacillin 0%, trimethoprim/sulfamethoxazole 100% and vancomycin 100%. **Conclusion:** There is a significant prevalence of MRSA in patients presenting with SSTIs to the EDs of a Canadian academic health care centre. MRSA should be considered when empiric antibiotic therapy is initiated, particularly in patients with known risk factors. **Keywords:** methicillan-resistant staphylococcus aureus, skin or soft tissue infections, antibiotic susceptibility

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RANDOMIZED crossover trial comparing the success rates of 2 mechanical intraosseous infusion devices

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Introduction: Administration of medications via the intraosseous (IO) route has been proven to be a lifesaving procedure in critically ill or injured children. Two mechanical intraosseous infusion (IOI) devices have been approved for use in children, the spring-loaded IOI device (Bone Injection Gun) and the battery-powered IOI drill (EZ-IO). The objective of this study was to compare the success rates and the ease-of-use of the 2 devices. **Methods:** A randomized crossover study was conducted in a local paramedic training course with 29 paramedic students participating. Participants watched 2 videos describing the use of the spring-loaded IOI device (SLIOID) and the battery-powered IOI drill (BPIOID), followed by a demonstration on how to use each device on a turkey bone model. Thereafter, subjects were divided into the 2 groups of the study: SLIOID-first, and BPIOID-first. Each participant performed one IO insertion attempt with each device independently. All attempts were filmed by a video camera. Successful placement was defined as the visualization of fluid flow from the IO cavity. Following the study procedure, participants were asked to complete a 2 item questionnaire recording their ranking of the ease-of-use of each device and their "first choice

device." **Results:** Participants had a significantly higher one-attempt success rate with the BPIOID than with the SLIOID (28/29 v. 19/29, $p < 0.016$). In 6 of the 10 failed attempts with the SLIOID, the stylet was stuck within the needle and could not be removed. Participants assessed the BPIOID as easier to use compared to the SLIOID ($p < 0.0094$), and 20 of the 29 (69%) chose BPIOID over SLIOID as their device of choice. **Conclusion:** When tested by paramedic students on a bone model, the battery-powered IOI drill demonstrated higher success rates than the spring-loaded IOI device, and was found easier to use. **Keywords:** intraosseus infusion devices, randomized trial, pediatrics

Winner of the CAEP Resident Research Abstract Award

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A RANDOMIZED control trial of splinting v. casting for toddler's fractures in children

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Introduction: A Toddler's fracture is defined as a nondisplaced fracture of the mid to distal tibial shaft in children 9 to 36 months of age. These fractures are inherently stable; however the current recommendation is to treat even suspected fractures presumptively with immobilization in a long leg cast for 3–4 weeks. The objective of this study was to determine if treating children diagnosed with a toddler's fracture with a splint for 1 week, compared with a cast for 3 weeks, results in an earlier return to preinjury activity level, i.e., walking with no limp, without compromising healing or pain control. **Methods:** This was a prospective randomized controlled trial in the emergency department of a tertiary care children's hospital. Participants were children 9 to 36 months of age diagnosed with toddler's fractures who were randomly assigned to treatment with an above-the-knee fiberglass cast or a below knee sugar tong splint. The cast was removed at 3 weeks, and the splint at 1 week. Patients were followed radiographically at 1 and 3 weeks and clinically at 1, 3, and 6 weeks. Duration of limp was assessed clinically at 3 and 6 weeks, and using a 6-week parent log book. Pain control was assessed using a parent questionnaire adapted from the Parent's Postoperative Pain Measure by Chambers et al. **Results:** We randomly assigned 46 patients, and 41 were included in the final analysis: 22 in the splint group and 19 in the cast group. Study groups were similar in age, development and presenting findings. There were significant differences in limping at 3 weeks (7/22 [33%] v. 18/19 [95%]; absolute risk difference 62% [95% CI 41–85]) and 6 weeks (4/21 [19%] v. 13/18 [72%]; absolute risk difference 53% [95% CI 27–80]), indicating less limping in the splint group. There were no significant differences in pain between the groups. There were no complications in either group. **Conclusion:** Children treated with below knee sugar tong splints have an earlier time of return to normal activity with no apparent compromise in pain control. **Keywords:** toddler's fractures, splinting, casting

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STEROIDS in peritonsillar (SIP) abscess treatment: a controlled clinical trial

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Introduction: Sore throat is a common, benign emergency department (ED) presentation; however, peritonsillar abscess (PTA) is a complication that requires aggressive management. Use of systemic corticosteroids (CS) in PTA is occurring without any evidence of benefit. This study examined the efficacy and safety of CS treatment for patients with PTA. **Methods:** A controlled trial with concealed allocation and double-blinding was conducted in 2 Canadian EDs. Patients diagnosed with PTA in whom abscess drainage was attempted in the ED were approached by reaserch staff. Following informed consent, all patients received 48 hours of clindamycin (600 mg IV every 8 h) and a single dose of the study drug (dexamethasone [DEX] 10 mg or placebo [PLAC] IV). Follow-up occurred at 24 h, 48 h and 7 days; patients completed a diary card for 48 h. The primary outcome was pain scores (0 [no pain]–10 [worst pain]) at 48 h; other outcomes were side effects and return to normal activities/diet. **Results:** 182 patients were screened for eligibility; 41 patients were enrolled (21 DEX; 20 PLAC). The most common exclusion (19%) was coexisting CS treatment. The median age of enrolled patients was 25 years and more were male (68%). A median of 2 aspirations resulted in drainage of 3 mL of pus. ED pain scores were 6.1 at discharge. At 24 h, those receiving DEX reported lower pain scores (1.4 v. 5.1; $p = 0.009$); however these differences disappeared by 48 h ($p = 0.22$) and 7 days ($p = 0.4$). At 24 h, more patients receiving DEX returned to normal activities (33% v. 11%) and dietary intake (38% v. 25%); however, these differences were not significant and disappeared by 48 h and 7 days. Side effects were rare and did not differ between groups ($p > 0.05$). **Conclusion:** Combined with PTA drainage and IV antibiotics, 10 mg IV DEX resulted in less pain at 24 h when compared to PLAC, without any serious side effects. This effect is short-lived and further research is required on factors associated with PTA treatment success. **Keywords:** peritonsillar abscess, corticosteroids, randomized controlled trial

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OUT-of-hospital cardiac arrest survival after the sequential implementation of 2005 AHA guidelines for compressions, ventilations, and induced hypothermia

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Introduction: To assess survival from out-of-hospital cardiac arrest following community-wide implementation of 2005 American Heart Association (AHA) guidelines for compressions, ventilations, and induced hypothermia. **Methods:** Before–after cohort comparing survival to discharge for the following sequential interventions (months): baseline (16), new CPR (12), impedance threshold device (ITD) (6), hypothermia (12). Included were all adults treated for cardiac arrest by emergency responders in an urban/suburban emergency medical services (EMS) system (population 840 000) with existing advanced life support (ALS). Excluded were patients < 16 years old and trauma patients. Electronic dispatch and ambulance records were reviewed. Survival and neurological outcomes were compared between periods, and adjusted odds ratios with 95% confidence intervals (CI) for survival by phase were determined by multivariate logistic regression. **Results:** From January 2004 to October 2007, 1365 cardiac arrest patients were eligible for inclusion: baseline $n = 425$, new CPR $n = 369$, ITD $n = 161$, hypothermia $n = 410$. Across study phases, patients had similar demographic, clinical, and EMS characteristics. Overall and witnessed-ventricular fibrillation/ventricular tachycardia (VF/VT) survival, respectively, increased significantly between phases: baseline 4.5%, 13.8%; new CPR 7.3%, 23.9%; ITD 8.1%, 34.6%; hypothermia 11.5%, 40.8%. The absolute increase (95% CI) for overall survival from baseline to hypothermia was 7.0% (3.4–10.8) and witnessed-VF/VT survival was 27.0% (13.2–39.7), representing an additional 25 lives saved annually in this study community. **Conclusion:** The sequential implementation of 2005 AHA guidelines for compressions, ventilations, and induced hypothermia significantly improved survival after cardiac arrest in this community. EMS systems can improve their "chain of survival" using a comprehensive approach involving providers from 911 dispatch through emergency and intensive care

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departments. **Keywords:** therapeutic hypothermia, cardiac arrest, implementation science

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THE INCIDENCE of postintubation hemodynamic instability associated with emergent endotracheal intubations: a systematic review

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Introduction: The development of hemodynamic instability following emergent endotracheal intubation and the initiation of positive pressure ventilation is a potentially life threatening adverse event. Unfortunately, little is known about postintubation hemodynamic instability (PIHI). The objective of this study is to determine the incidence of PIHI in patients who require emergent intubation and to identify factors contributing to the likelihood of this adverse event. **Methods:** This is a systematic review of published adult, in-hospital studies of emergent endotracheal intubation. A systematic search of Medline (1950–November 2008) and relevant bibliographies was completed. No restrictions were placed on language of publication, patient diagnosis, indication for intubation, or intubation method employed. One author independently reviewed all citations, and 2 authors reviewed all candidate articles during the process of final selection. Data was independently retrieved on a standardized data abstraction form by 2 authors. Random effects meta-analysis was used to estimate the pooled prevalence of PIHI across studies. **Results:** A total of 22 relevant studies were identified and included in our analysis. One randomized controlled trial and 21 observational studies met eligibility criteria. Sample sizes ranged from 33 to 2833 patients (median 214). The prevalence of postintubation hypotension ranged from 0% to 39%, with a random effects, pooled estimate of 8.5% (95% CI 4.8%–14.5%). Studies that defined PIHI with a temporal relationship between blood pressure reduction and intubation had a PIHI prevalence of 13.9% (95% CI 8.8%–21.2%) compared with a prevalence of 5.0% (95% CI 1.6%–15.0%) in studies that did not. Heterogeneity between studies limits conclusions on the effect of indication for intubation, intubator experience, medications utilized to facilitate intubation, and management strategies used for PIHI. **Conclusion:** Postintubation hemodynamic instability occurs commonly after emergent intubations. **Keywords:** postintubation hypotension, endotrachal intubation, systematic review

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ATTITUDES and factors associated with successful CPR knowledge transfer in an older population most likely to witness cardiac arrest: a qualitative iterative survey

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Introduction: Bystander CPR rates are lowest at home, where cardiac arrest is most likely to occur. To aid the design of a national survey, we sought to identify barriers and facilitators to performing CPR and taking CPR training among older citizens. **Methods:** We conducted semistructured qualitative interviews by telephone or in-person with a purposeful sample of independent-living individuals aged 55 and older from urban and rural settings. We developed an interview guide based on the constructs of the Theory of Planned Behavior, which elicits salient attitudes, social influences, and barriers and facilitators potentially influencing CPR training and performance. Interviews were recorded, transcribed verbatim, and analyzed until data saturation was achieved. Two independent reviewers performed inductive analyses to identify emerging categories and themes, and ranked them by way of consensus. **Results:** Demographics for the 24 interviewees: mean age 71.4, female 58.3%, urban location 75.0%, single dwelling 58.3%, CPR training 79.2%, CPR on real victim 8.3%. Facilitators of CPR training included: 1) classes in a convenient location; 2) more advertisements; and 3) having a spouse. Barriers to taking CPR training included: 1) perception of physical limitations; 2) time commitment; and 3) cost. Facilitators of providing CPR included: 1) 911 CPR instructions; 2) reminders/pocket cards; and 3) frequent but brief updates. Barriers to providing CPR included: 1) physical limitations; 2) lack of confidence; and 3) ambivalence of duty to act in a large group. **Conclusion:** This is the first qualitative study using the Theory of Planned Behavior to identify key facilitators and barriers for CPR training and performance in an independent-living population aged 55 and older. These findings will inform the design of a national survey of barriers and facilitators, and interventional trials to improve CPR training and performance in seniors, the population most likely to witness a cardiac arrest. **Keywords:** CPR training, knowledge translation, qualitative research

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MULTICENTRE prospective validation of the ABCD2 rule for predicting outcomes of transient ischemic attack patients in the ED

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Introduction: The ABCD2 clinical decision rule is used to stratify transient ischemic attack (TIA) patients as high or low risk for early stroke or vascular death. This study prospectively assessed the accuracy of this score for subsequent stroke/death at 7, 30 and 90 days. **Methods:** We conducted this prospective cohort study at 8 university EDs over a 1-year period. We enrolled patients ≥ 18 years, with a chief complaint of acute onset neurological deficit diagnosed as TIA, possible TIA, or TIA/minor stroke as their final ED diagnosis. Physicians completed data forms, including the points for the ABCD2 score, and interpreted high or low risk status, prior to discharging or referring patients to consulting services. An ABCD2 score > 5 is deemed high risk by the original authors. Patients had 7- and 90-day structured telephone follow-ups with a validated stroke assessment tool. The outcome criterion was stroke or vascular death assessed by a blinded adjudication committee. Analysis included sensitivity and specificity with 95% CIs for stroke/death at 7, 30 and 90 days. **Results:** We enrolled 313 patients with mean age 68.1 years (range 26–94), and female 52.1%. Patients had these outcomes: 7-day TIA 2.9%, stroke 1.6%, vascular death 0%; 30-day TIA 5.1%, stroke 2.6%, vascular death 0%; and 90-day TIA 8.3%, stroke 3.5%, death 0.4%. The ABCD2 score > 5 had sensitivities for stroke/vascular death at 7, 30 and 90 days, respectively, of 60.0% (95% CI 14%–94%), 37.5% (8%–75%), 27.3% (6%–60%).The respective specificities were 78.6% (73%–83%), 78.4% (73%–82%), 78.1% (73%–82%). **Conclusion:** This prospective study of ED patients with TIA found the ABCD2 TIA rule to be insensitive for predicting stroke or death and less sensitive than previous studies. The ABCD2 rule is not sensitive enough to be the sole guide for risk assessment of TIA patients in the ED and further research is required. **Keywords:** TIA, ABCD2 rule, clinical prediction rule

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PREDICTORS of prolonged length of emergency department stay for CTAS level 4 and 5 patients

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Introduction: Prolonged EDLOS has been associated with poor patient outcomes, decreased patient satisfaction and increased patients leaving without being seen. Pay for performance is becoming a new paradigm for health care funding in some Canadian jurisdictions. In British Columbia, this model was adapted to the emergency department and provided incentive for both high and low acuity patients that were discharged and patients who were admitted to hospital within target times. The purpose of this study was to identify predictors of prolonged emergency department (ED) length of stay (more than 2 hours) in discharged CTAS level 4 and 5 patients. We hypothesized that patients who required medication, imaging, or lab orders would be more likely to have a prolonged ED length of stay. **Methods:** This was an administrative database study, undertaken in a tertiary care emergency department with over 60 000 visits per year. All CTAS level 4 and 5 patient visits between April 2007–April 2008 were included. Length of ED stay, mode of patient arrival, CTAS level (4 or 5), orders (imaging, consult, lab, medication), time to MD, and day of week were extracted from the ED administrative database. Predictors of prolonged ED Length of stay were analyzed using multivariable logistic regression. **Results:** 27 028 CTAS level 4 and 5 patient visits occurred and 13 381 (49.5%) had a prolonged ED length of stay. The adjusted odds ratios (OR) for prolonged ED length of stay was 5.24 (95% CI 4.93–5.56) if patients had any orders, 2.09 (95% CI 1.95–2.23) if they arrived by ambulance, 1.58 (95% CI 1.48–1.68) for CTAS 4 (v. CTAS 5) patients, and 2.36 (95% CI 2.28–2.34) for each 30-minute increase in time to be seen by the ED physician. **Conclusion:** Independent predictors of prolonged ED length of stay were: arriving by ambulance, CTAS 4, requiring orders and delay in seeing the ED physician. The latter 2 factors are amenable to improvement in process efficiencies. **Keywords:** Canadian Triage and Acuity Scale, length of stay, administrative database

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PREVALENCE and characterization of community acquired MRSA in high-risk individuals in Toronto

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Introduction: In the USA, community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) has now replaced methicillin-susceptible *S. aureus* (MSSA) as the primary cause of SSTI's. Among the most important commonly cited risks for CA-MRSA infection, are factors associated with homelessness. We have previously reported a 4% colonization rate in homeless men at a large Toronto shelter. In this study we describe the increasing prevalence of MRSA colonization in this high-risk population of homeless men in 2008, compared with 2007. **Methods:** Between June 6 and August 15, 2008, 319 consenting male residents of a Toronto community shelter provided nasal and axillary swabs, and information regarding risk factors for MRSA colonization. Swabs were enriched and selectively cultured for MRSA and MSSA, which were identified using standard methods. MRSA were typed by SmaI PFGE and SCCmec type and presence of PVL was determined by PCR. We use simple descriptive statistics, and multiple regression analysis for risk factors associated with MRSA. **Results:** In 2008, 132/319 (41.4%) and 38/319 (11.9%) residents screened positive for MSSA and MRSA respectively, compared to 110/295 (37.3%) and 12/295 (4.1%) positive for MSSA and MRSA in 2007. 10 distinct MRSA isolates were found, 36/38 residents were colonized with CA-MRSA (all SCCmec IV, 29/36 (81%) PVL +), and 2/36 with HA-MRSA (both SCCmec II, PVL -). In addition to β-lactams, 10/36 (28%) of CA-MRSA isolates were clindamycin resistant. The only demographic factor associated with MRSA colonization was being of aboriginal descent. Hospitalization in the previous 12 months was associated with a strong trend of MRSA colonization compared to MSSA (14/38, 37% v. 61/284, 22% $p = 0.06$). **Conclusion:** CA-MRSA colonization rates are increasing in the homeless population in Toronto, and appear to be much higher than cited rates in the general population. Clindamycin resistance is increasingly common in this group. The implications of increasing colonization rates needs to be better understood. **Keywords:** methicillin resistant *staphylococcus aureus*, community acquired MRSA, colonization

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QUALITATIVE results from an Ontario hospital patient flow improvement program pilot to improve emergency department waiting times

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Introduction: Ontario adopted an emergency department strategy to reduce waiting times which includes a patient flow improvement program. A pilot version was tested at a large community hospital and a qualitative evaluation was developed to profile the intervention model; and identify key success factors to guide the development of the program. **Methods:** Qualitative in-person interviews and focus groups were conducted at the pilot-site with consultant coaches, senior administrative leadership, and with the lead staff in the 3 teams (Emergency Department, Admissions and Discharge). In-person and follow up interviews were conducted. Data were analyzed via the grounded theory approach. **Results:** 26 staff participated in focus groups and indepth interviews. The 9-week intervention included a patient flow diagnostic, applied "lean" technique module, and development of "actions plans." This resulted in 40 separate "solution pilot" interventions, implemented in 4 phases: Preparation (procurement of resources and definition of evaluation metrics); Education & staff orientation; Pilot-implementation and monitoring; and Postpilot evaluation and reporting. Interviews highlighted the complexity and dedication of resources required to implement a hospital-wide approach to patient-flow improvement and the importance of engaging senior staff leaders and IT/Decision support throughout the process. Teams acknowledged improved communication, change culture and capacities, and highlighted the contribution of communication strategies and visible senior leadership support as drivers of implementation success and sustainability. **Conclusion:** Hospital-wide patient flow improvement processes are complex and require key staff engagement and senior management leadership to ensure sustained change efforts. Key success factors for broader implementation include: structured implementation pace, dedicated staff leaders, physician engagement strategy, locally designed solutions, diverse evaluation metrics, and explicit planning for sustainability. **Keywords:** waiting time strategy, flow management, ED crowding

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IMPACT of resident care on admission rates and emergency department length of stay

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Introduction: Care costs are 25%–35% higher in academic hospitals, partly due to trainee impact on admission rates, length of stay (LOS) and test utilization. Residents may admit more patients or

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hold them for longer investigation and treatment, thereby reducing ED efficiency. Our hypothesis was that patients seen by a resident would have higher admission rates and ED LOS than those managed by an emergency physician (EP) alone. **Methods:** This administrative database study was conducted at Foothills Medical Centre, a tertiary referral centre in Calgary. Patients triaged between Oct. 2007 and Sept. 2008 were eligible. Minor treatment patients and those who left without being seen were excluded. Treating physicians were identified based on their electronic sign-on, and patients were stratified into 2 groups: those managed by an EP alone, and those comanaged with a resident (RES). Demographics, acuity, disposition and ED LOS were gathered from our ED database. Primary outcomes included admission rates and ED LOS. **Results:** During the study, 36 779 patients were treated by ED physicians alone and 4604 with residents (n = 41 383). Patient characteristics were similar for the EP and RES groups, including mean age (50.5 v. 52.5 yr), male gender (48.8% v. 48.8%), proportion in CTAS 1–3 (95.1% v. 95.3%), EMS arrival rate (44.7% v. 43.2%) and weekend visit (29.2% v. 29.4%). Processing time from physician assessment to discharge was shorter for EP patients: 173 min (IQR, 92–310) v. 209 min (IQR, 121–348).Other outcomes were similar in the EP v. RES groups, including admission rates (33.3% v. 33.9%) and median ED LOS: 6.2 h (IQR, 4.0–9.2) v. 6.4 h (IQR, 4.2–9.0). **Conclusion:** In this ED setting, resident involvement in care did not translate into higher admission rates and LOS. **Keywords:** resident education, admission rates, length of stay

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A SIMULATION methodology for optimizing emergency department triage nurse staffing

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Objective: Emergency department (ED) patient visits are increasing dramatically while resources virtually remain unchanged thus patients continue to suffer extended delays. This study uses simulation methodology to determine nurse allocation policies that would improve wait times to ED triage while minimizing the number of nurse hours used. **Methods:** We conducted an observational time-and-motion study at a tertiary care ED in Canada (annual census of 66 000 visits) over a 2-week period (mean 3 h/day). We observed the time from arrival to triage and triage service times between the hours of 8:00 and 17:00. We developed simulation models (ARENA) with an added optimization component to examine 2 techniques for triage nurse scheduling — a static approach with a fixed schedule and a dynamic approach where nurse assignment depends on the queue length. **Results:** We obtained data on 113 walk-ins and 40 ambulance patients. We found significant differences ($p <$ 0.01) between the distributions of service times (mean; SD in min) for walk-ins (4.92; 2.35) and ambulances (5.98; 2.51). Therefore, the 2 processes were modeled separately in the simulation framework. Our analysis shows that the choice of a scheduling technique depends on the rate of patient arrivals. For large number of arrivals, the static method results in higher nurse utilization (76% v. 70%), while the flexibility of the dynamic method is best exploited with lower arrival rates (70% v. 67%). Results indicate that without additional resources Canadian Triage Acuity Scale (CTAS) wait time standards are met in only 24% of cases. A minimum of 5 and 6 extra nurse hours per day for the static and dynamic models respectively are needed to achieve 75% compliance with the CTAS wait times. **Conclusion:** Triage is an understudied area where significant delays can occur, threatening the quality of care. Improving wait times requires careful planning, which can be achieved through the use of a simulation/optimization methodology. **Keywords:** simulation, ED staffing, triage

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WILL diversion of less urgent patients reduce emergency department access block?

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Introduction: Many health experts believe that diverting less urgent patients to other care locations will substantially reduce emergency department (ED) access block. Our objective was to estimate the impact of less urgent patient diversion on ED access block in an urban Canadian hospital, and compare that against other initiatives. **Methods:** We captured arrival times, departure times, disposition and triage acuity levels for all patients seen over a 1-year period (April 1, 2004 to March 31, 2005) at an urban Vancouver ED. Based on a 2-week observation of actual patient placements, we determined that all admitted patients and 60% of nonadmitted patients (100% CTAS1–2; 79% CTAS 3–4; 0% CTAS 5) require a stretcher. Using a simulation model queuing system, we conducted a scenario analysis to determine how many stretchers would be necessary to assure a 90% access rate (stretcher available for patients who need one 90% of the time). We then modeled the impact of diverting 10% or 50% of CTAS level 4–5 patients elsewhere and of limiting ED boarding times for admitted patients. **Results:** During the study, 30 040 CTAS 1–3 patients and 32 060 CTAS 4–5 patients were treated. The model predicted that, at baseline, with an average admitted patient boarding time (LOS) of 15.5 hours, 50 ED stretchers were needed to achieve a 90% access rate. Removing 10% of CTAS 4–5 visits had no impact on ED stretcher requirement, while removing 50% of these patients reduced ED stretcher requirement by 3 (6%). Conversely, reducing admitted patient LOS to 10 hours or 6 hours reduced stretcher requirement by 12 (24%) and 16 (32%). **Conclusion:** Simulation modeling using real patient arrival and departure data suggests that diverting less urgent patients will have minimal impact on patient access, while reducing ED LOS for admitted patients will have a large impact. **Keywords:** low acuity patients, access block, Canadian Triage and Acuity Scale

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PRETREATMENT antibiotic influence on the management of peritonsillar abscess (PTA) in a regional centre

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Introduction: Acute sore throat is a common presentation to the emergency department (ED) and usually has a benign course. Peritonsillar cellulitis (PTC) and abscess (PTA) are complications associated with throat infections that require more aggressive treatment with antibiotics and occasionally incision and drainage (I&D). Prior antibiotic use may influence outcome, and this study examined patients presenting to EDs in one Canadian region. **Methods:** Patient charts were retrospectively identified as PTC or PTA from 5 Alberta EDs within Capital Health. Charts underwent a structured review by a trained research assistant and pre-ED, in-ED and post-ED information was abstracted. This chart review focuses on the management based on antibiotic use prior to ED presentation for PTA; data were analyzed using χ^2, t tests, and odds ratios (OR) with 95% confidence intervals (CI). **Results:** Overall, 526 patient charts were identified as PTC/PTA; 332 (63%) had a diagnosis of PTA. Patients with PTA and PTC had similar age, sex and smoking status. The majority of PTA patients (175 [53%]) had been prescribed antibiotics prior to their ED visit. Patients already receiving antibiotics received more aggressive ED treatment including: I&D attempts (OR 2.02; 95% CI 1.28 to 3.17), systemic corticosteroids (CS) (OR 1.60; 95% CI 0.98 to 2.61), and specialist consults (OR 2.13; 95% CI 1.35 to 3.35). While most patients (> 92%) were discharged, there was no difference

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between the groups (OR 1.03; 95% CI 0.46 to 2.29). There were no important differences in treatment between men and women. Return ED visits were common in both groups. **Conclusion:** The results suggest that prior antibiotic use influences management in patients with PTA, and that overall treatment is not standardized. High use of CS was seen in this review and repeat ED visits were common. An evidence-based protocol in this patient group may improve management in the future. **Keywords:** peritonisillar abcess, peritonsillar cellulitis, antibiotic utilization

Winner of the CAEP Medical Student Research Abstract Award

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THE EFFECTIVENESS of corticosteroids in the treatment of sore throat: a systematic review of controlled clinical trials

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Introduction: Sore throat is a common emergency department (ED) symptom; most cases are self-limiting viral infections. Despite this, physicians prescribe antibiotics and corticosteroids (CS) to reduce patient (pt) symptoms. This systematic review examined the effectiveness of systemic CS for relief of acute sore throat symptoms. **Methods:** Cochrane, MEDLINE, EMBASE, Scopus and BIOSIS Previews electronic searches (ES); conference proceedings and clinical trials databases (CT), and Web of Science (WS) searches were performed. Only randomised controlled trials in which CS (alone or in combination with regular abortive therapy) were compared to placebo for treatment of acute sore throat in adults or children were included; mononucleosis studies were excluded. Relevance, inclusion, and study quality were assessed independently by 2 reviewers. Weighted mean differences (WMD) are reported with 95% confidence intervals (CI). **Results:** Searches identified 73 ES, 235 CT and 21 WS potentially relevant citations; 8 studies involving 849 pts met the inclusion criteria. Studies were published between 1993 and 2005, had high quality scores, and 3 exclusively recruited children. Half of the included trials reported on Group A Beta-Hemolytic Streptococci (GABHS) subgroups; all studies provided antibiotics. Most treatments compared single-dose CS to placebo; various oral and IM CS doses were administered. CS improved pain at 24 (WMD = –1.35; 95% CI –2.1to –0.6) and 48 (–0.98; 95% CI –1.52 to –0.4) h; results for 24 h were heterogeneous (I2 > 85%). CS reduced time to clinically significant pain relief (–2.86 h; 95% CI –3.6 to –2.12); results were heterogeneous (I2 > 91%). Heterogeneity was not explained by the GABHS status. Side effect profiles were similar between CS and placebo groups. **Conclusion:** The use of CS in the treatment of sore throat demonstrates heterogeneity. Despite this, there appears to be a small benefit associated with this treatment. Research is required to determine which subgroups benefit most. **Keywords:** corticosteroids, pharyngitis, systematic review

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ASSESSMENT of inter-rater reliability for the recognition of agonal breathing and cardiac arrest by 9-1-1 dispatchers

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Introduction: Agonal breathing is present in 40% of all out-of-hospital cardiac arrest victims, and can impair the ability of 9-1-1 dispatchers to recognize cardiac arrest and provide CPR instructions to callers. Since a dispatcher's perception that agonal breathing is present can be subjective, we sought to determine the inter-rater agreement among 9-1-1 dispatchers in identifying the presence of agonal breathing during an analysis of recorded cardiac arrest calls. **Methods:** We asked 15 dispatchers to review 15 cardiac arrest audio recordings, and determine if agonal breathing was present or not. We selected the recordings among confirmed cardiac arrest cases collected prospectively in Ottawa for the Ontario Prehospital Advanced Life Support Study. All participants were previously trained to use a provincial dispatch protocol including dispatch-assisted CPR instructions. Our study instrument included a representative number (6) of randomly distributed cases where agonal breathing was judged to be present in the opinion of the investigators. We calculated agreement between dispatchers and the investigators using Cohen's unweighted kappa, and agreement among dispatchers using multirater Fleiss kappa with 95% confidence intervals (CI). **Results:** Characteristics for the 15 dispatchers were: median age 26 to 30, median years of experience 5, median annual number of cardiac arrests calls 20, laymen 13, paramedics 2. All were trained in CPR in the last year. The percentage of correct responses was 83.1% and 2 dispatchers (13.3%) correctly identified all 15 cases. Agreement for the presence of agonal breathing between dispatchers and investigators was 0.64 (95% CI 0.54–0.75), and was 0.53 (95% CI 0.49–0.58) among dispatchers. **Conclusion:** We found substantial agreement with investigators and moderate agreement among dispatchers, suggesting that reliable assessment of agonal breathing during the analyses of 9-1-1 cardiac arrest intervention recordings is possible for cardiac arrest research. **Keywords:** agonal breathing, cardiac arrest, cardiopulmonary resuscitation

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PRIMARY care paramedics independently triaging patients for primary percutaneous angioplasty in acute ST-segment elevation myocardial infarction

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Introduction: Advanced care paramedics are able to identify patients with acute ST-elevation myocardial infarction and activate a bypass protocol for primary percutaneous coronary intervention (PCI) successfully. We sought to measure the accuracy of primary care paramedics' interpretations of 12-lead ECG in patients with chest pain for acute ST-elevation myocardial infarction and independently activate a bypass protocol for primary PCI. **Methods:** We conducted a standardized review of consecutive ambulance call records for all patients with chest pain who were transported by dual crew primary care paramedics. These were cases where a 12-lead ECG was done and interpreted, in the field, by primary care paramedics who took a 2-day training session in interpreting ECGs. Two blinded emergency physicians independently reviewed prehospital health records and the ECGs for ST-elevation myocardial infarction, using explicit criteria. **Results:** Between January 1, 2007 and December 31, 2007, dual PCP crews transported 878 patients with chest pain. Of these, 755 patients met our inclusion criteria. The mean age was 63 years, and 52.6% were men. Approximately half of the included patients had a previous history of coronary artery disease. The sensitivity of detecting acute ST-elevation myocardial infarction by Primary Care Paramedics was 89.6% (95% CI 79.7–95.7) with specificity of 97.8% (95% CI 96.4–98.8). The positive predictive value was 80% (95% CI 69.2–88.4), and the negative predictive value was 98.9% (95% CI 98.2–99.7) with an accuracy of 97%. The kappa coefficient for agreement between primary care paramedics and emergency physicians was 0.82 (95% CI 0.75–0.89). **Conclusion:** With proper training, Primary Care Paramedics can accurately diagnose acute ST-elevation myocardial infarction and independently triage patients for primary PCI, thus, reducing delays to reperfusion. **Keywords:** emergency medical services, acute elevation ST-elevation myocardial infarction, percutaneous coronary intervention

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COMPARATIVE reliability of structured and unstructured interviews for admission to an emergency medicine residency program

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Introduction: Reliability of structured interviews (SI) is consistently reported as higher than that of unstructured interviews (UI). No study directly compares the reliability of SI and UI using the same pool of interviewees. This study compares the interrater reliability of both types of interview when applied to a common pool of applicants to an emergency medicine (EM) residency program. **Methods:** In this prospective study, a SI was added to the 2 UI traditionally used in this program's admission process. Each candidate was interviewed by all 3 panels. The SI tool comprised 7 clinical scenarios exploring 4 dimensions of performance deemed essential for EM residents, extracted through a rigorous job analysis. Each scenario was rated on an anchored 5-point Likert scale. The UI panels used the program's traditional form and marked candidates on 5 criteria, each on a 10-point scale. The UI panels also rated candidates on the same 4 dimensions rated by the SI panel, on a 5-point scale. Outcomes were interrater reliability coefficients, inter-item consistency, and dimensionality of each interview tool. **Results:** 30 candidates were interviewed. Interrater reliability was 0.81 (0.64, 0.86) and 0.71 (0.55, 0.81) for the UI panels and 0.43 (0.01, 0.55) for the SI one. Reliability of the UI panels on the 4 dimensions reached 0.50 (0.35, 0.61) and 0.46 (0.00, 0.56). Inter-item consistency varied from 0.86 to 0.96 for the UI panels, and from 0.48 to 0.61 for the SI panel. Only the SI was multidimensional. **Conclusion:** Our SI tool did not achieve higher interrater reliability than the UI process but was successful at discriminating between several dimensions. The UI panels did not perform better that the SI panel when assessing the 4 essential dimensions. Allowing the SI tool to more deeply assess each dimension by increasing the number of questions per dimension would lead to higher interrater reliability. Options include one long SI assessing all dimensions or several shorter interviews each assessing one dimension. **Keywords:** structured interviews, resident selection, admission criteria

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ASSESSMENT tool for a standardized ventricular fibrillation cardiac arrest

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Introduction: Emergency Medicine training programs need competency-based assessment tools to evaluate how trainees will perform in resuscitation scenarios. Simulation-based strategies with standardized scenarios and predefined checklists must be developed to achieve this goal. We set out to derive and test the performance of this assessment tool for a standardized ventricular fibrillation (VF) cardiac arrest scenario. **Methods:** A 3-member expert panel derived the assessment tool, which was comprised of 3 separate checklists: performance of essential actions, global assessment score, and time to critical actions. Undergraduate and postgraduate trainees were videotaped in the simulation lab while performing as "code blue" team leaders in a widely used ACLS training protocol VF cardiac arrest scenario. A second panel of 3 clinician experts trained in simulation-based medical education independently evaluated the videotapes using the assessment tool. Correlation analyses and analysis of variance were applied to the assessment of the tool's performance. **Results:** 18 trainees (7 medical and nursing students, 7 junior residents, and 4 senior residents) completed the standardized VF scenario (mean total time 167 seconds; range 132 to 217 seconds). Inter-rater reliability for the total scores on the essential actions was high (Spearman's rho: 0.75 to 0.76). Checklist scores for the essential actions and the global assessment scores were also highly correlated (rho = 0.86). When comparing overall performance, senior residents outperformed junior residents, who outperformed medical students, in essential actions (p = 0.02), global assessment (p = 0.01), but not time to action (p = 0.36). **Conclusion:** This study demonstrates a valid simulation-based assessment tool for a standardized VF cardiac arrest scenario and shows great promise for the development and implementation of additional simulation-based assessment tools to evaluate medical trainees in a manner that is valid, competency-based, and that promotes patient safety. **Keywords:** simulation, assessment tool, ventricular fibrillation

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TEACHING death notification skills to emergency medicine residents: a multicentre validation of the GRIEV_ING educational intervention

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Introduction: Skill in death notification is a mandatory competency for emergency physicians. Multiple methods have been used to teach death notification skills to emergency medicine physicians but most require extensive curriculum time and provide little direct "high stakes" experience. GRIEV_ING is a time efficient, interactive curriculum using standardized patients to provide residents with actual death notification experiences. In this study, we report on the multicentre validation of GRIEV_ING to improve resident performance in death notification competency and the interpersonal relationship aspects of care. **Methods:** We enrolled 99 emergency medicine residents from 6 training programs in the southeastern US to participate in the GRIEV_ING curriculum. We used a pre–post repeated measures design to assess resident proficiency in death notification competency and interpersonal communication. All residents participated in a simulated death notification using Standardized Patient Survivors (SS) Pre and Post GRIEV_ING training. SS realistically portray family members and provide structured scores on resident performance using a 39-item competency instrument and a 9-item interpersonal communication instrument. We compared pre- to post scores on all indices using GLM Analyses of Variance. **Results:** 94 residents completed both SS encounters. There were no demographic or performance differences by site. Overall, residents demonstrated significant gains in death notification competence (F1, 92 = 122.1, p < 0.001). Physician–survivor interpersonal relationship communication changes (time: F1, 90 = 2.58, p = 0.112) were nonsignificant. **Conclusion:** We have demonstrated in a multi-institutional study that the GRIEV_ING death notification training represents an effective educational intervention to improve emergency medicine residents' death notification competence. This intervention is broadly generalizable and provides a time efficient method for educators to teach and assess death notification competence. **Keywords:** death notification, communication, residency training

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FACTORS associated with relapse after discharge from the emergency department with acute asthma: the role of nonmedication factors

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Introduction: Relapse after discharge from the emergency department (ED) for asthma is problematic for patients (pts) and the health system. Systemic and inhaled corticosteroids (ICS) reduce relapses; the evidence for other factors varies. Moreover, previous research suffers from a lack of standardized therapy and poor methodological

quality. We provided standardized anti-inflammatory treatment to all pts and sought key factors associated with relapse. **Methods:** A controlled trial was conducted in 16 Canadian EDs. Pts with physician diagnosis of asthma, age 18–55, and no evidence of COPD were approached if they met criteria for discharge. Following informed consent, all pts underwent a structured ED interview and follow-up telephone interview 4 weeks later. At discharge all pts received 7 days of prednisone (50 mg orally daily); a prescription for inhaled corticosteroids (ICS) was advised. Relapse was clearly defined and adjudicated centrally. Data were analyzed using χ^2, *t* test, K-W test, and logistic regression. **Results:** Of 788 pts, 112 (14%) experienced a relapse (unscheduled visit for perceived worsening respiratory symptoms). Overall, more pts who relapsed were women (72% 55%; p = 0.001); all other demographic comparisons were similar between the groups. Pts who relapsed had more ED visits in the past 2 years (2 v. 1; $p < 0.0001$). Pre-ED features were similar between the groups except pts who relapsed more often used long-acting beta-agonists (LABA) and ICS combinations prior to their ED visit (44% v. 31%; p = 0.007). ED treatment was similar with almost all patients receiving corticosteroids (97% v. 98%), beta-agonists (63% v. 60%) and anticholinergics (69% v. 67%) in the first hour. Discharge pulmonary functions were also similar. **Conclusion:** Despite receiving aggressive anti-inflammatory treatment, 1 relapse occurred in every 7 discharged pts. The factors strongly associated with relapse included female sex, recent unstable asthma, and pretreatment with combined LABA + ICS agents. **Keywords:** asthma, asthma relapse, risk factors

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PARAMEDICS assessing elders at risk of independence loss (PERIL): nontransportation rates of older clients in 3 EMS systems

Lee JS, Verbeek RP, Kiss A, Macintyre P, Schull MJ, Morrison LJ, Calder L, Stiell IG, Rowe BH, Sookram S, Ryan DP, Naglie G; Sunnybrook and Women, University of Toronto, Toronto, ON

Introduction: Nontransportation of patients, either initiated by the patient or by emergency medical service (EMS) staff, is associated with increased morbidity, mortality and litigation. A previous British study showed that patients ≥ 65 years of age have the highest rates of nontransportation after an EMS calls, and that 30%–34% of nontransportation calls were for falls among older patients. Nontransportation rates of older EMS clients have not been well described in Canada. **Methods:** We conducted a prospective observational cohort study of patients ≥ 65 years of age who lived in their own home and were Canadian Triage Acuity Score (CTAS) 2 to 5. Paramedics from 3 EMS services (Edmonton, Ottawa and Toronto) were trained in study procedures. The requirement for informed consent was waived by our REB for this minimal risk study. **Results:** A total of 2184 eligible patients were enrolled between October 2005 and September 2008. Complete data are available for 1962/2184 subjects (89.9%). The mean age was 80.2 years, and 62% were female. CTAS was between 2 or 3 in 64% of patients. The most common chief complaint was falls in 230/1962 patients (11.7%), and 1072/1962 (54.6%) patients lived alone. The overall nontransportation rate was 282/1962 (14.6%, 95% CI 12.8% to 15.9%). Nontransportation rates differed substantially between the 3 EMS system and ranged from 63/781 at site 1 (8.1%, 95% CI 6.2% to 10.0%), 84/878 at site 2 (10.0%, 95% CI 7.6% to 11.5%), and 135/304 at site 3 (44.4%, 95% CI 38.8% to 50.0%). This difference was statistically significant (χ^2 265.7, df = 2, $p < 0.0001$). **Conclusion:** Nontransportation of older patients occurred in a significant minority of older patients. Variations in nontransportation rates between different EMS systems were unexpected in our sample, and should be explored in a broader national sample involving a larger number of systems. **Keywords:** emergency medical services, geriatrics, nontransportation

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INCREASED chest compression fraction is associated with increased return of spontaneous circulation in nonventricular fibrillation out-of-hospital cardiac arrest victims

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Introduction: Greater chest compression fraction (CCF, or proportion of CPR time spent providing compressions) is associated with better survival after out-of-hospital ventricular fibrillation (VF). We evaluated the effect of CCF on return of spontaneous circulation (ROSC) in out-of-hospital cardiac arrest (OOHCA) patients with non-VF rhythms. **Methods:** This secondary analysis included OOHCA patients prospectively enrolled in the ROC Epistry if: not witnessed by EMS, no automated external defibrillator (AED) shock prior to EMS arrival, received > 1 minute of CPR with CPR process measures available, and initial non-VF rhythm. We reviewed the first 5 minutes of electronic CPR records following AED application or until the first shock analysis, measuring the proportion of compressions/min when there was no recorded pulse. We studied the effect of CCF and key covariates on ROSC by logistic regression analyses. **Results:** Demographics of 2122 adult victims from 9 US and Canadian sites: mean age 67.3; male 61.1%; public location 10.6%; bystander witnessed 32.8%; bystander CPR 35.6%; interval from 911 to AED turned on 5 min : 24 s; initial rhythm asystole 64.3%, PEA 27.7%, other nonshock 8.0%; mean compression rate 110/min; median CCF 0.71; ROSC 42.5%; survival to hospital discharge 2.0%. Adjusted odds ratios (OR) (95% CI) for predictors of ROSC are: CCF (10% increase) 1.07 (1.02, 1.13); age (per yr) 1.00 (1.00, 1.01); male 0.93 (0.77, 1.12); public location 1.23 (0.92, 1.66); bystander witnessed 1.57 (1.29, 1.91); bystander CPR 0.96 (0.79, 1.16); compression rate (10 increase) 0.99 (0.95, 1.03); and time 911 to AED turned on 1.00 (1.00, 1.00). For CCF categories (using 0%–40% as reference): 41%–60% 1.41 (0.98, 2.01); 61%–80% 1.63 (1.15, 2.29); and 81%–100% 1.69 (1.17, 2.43) **Conclusion:** This is the first study to clearly demonstrate that increased CCF among non-VF OOHCA victims is associated with increased likelihood of ROSC. A large prospective trial is needed to study the effect of CCF on survival. **Keywords:** chest compressions, non-VT out-of-hospital cardiac arrests, chest compression fraction

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REFINING the definition of "abnormal electrocardiogram" to better predict short-term cardiac outcomes in adult syncope patients

Thiruganasambandamoorthy V, Hess EP, Perry JJ, Wells G, Stiell IG; University of Ottawa, Ottawa, ON

Introduction: The San Francisco Syncope Rule (SFSR) has not been consistently interpreted for stratifying risk in ED syncope patients because the item "abnormal electrocardiogram" (EKG) is not clearly defined. The aim of this study was to define EKG characteristics that better predict short-term cardiac outcomes in adult syncope patients. **Methods:** We conducted an 18-month health records review of consecutive patient visits to a tertiary care ED and included adults with a primary complaint of syncope (sudden transient loss of consciousness with complete recovery). We excluded patients with ongoing altered mental status, alcohol/illicit drug use, seizure, head injury, or severe trauma. Patient characteristics, 48 EKG findings and cardiac outcomes were extracted. 30-day outcomes were assessed from records at all local hospitals and the coroner's office and confirmed independently by a second blinded emergency physician.

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Variables with $p < 0.2$ on univariate analysis were selected for multivariate logistic regression (LR). **Results:** 505 patient visits were included: male 49.7%, mean age 58.5 years, heart failure 5.9%, arrhythmia 11.5%, admitted 12.3%. 26 cases (5.2%) had short-term cardiac outcomes (death 0.4%, MI 0.2%, pacer insertion 3.6% and arrhythmia [ventricular 0.8%, atrial 0.6%]). LR analysis found that only these findings on EKG were associated with cardiac outcomes: nonsinus rhythm, blocks (second or third degree AV, bifascicular, first degree AV with bundle branch), left axis deviation and monitor abnormalities (nonsinus, sinus pause or blocks as above). These EKG findings had a sensitivity of 86.7% (95% CI 71%–95% and specificity of 74.7% (74%–75%) whereas "abnormal EKG" per the SFSR had a sensitivity of 76.7% (60%–88%) and specificity of 45.3% (44%–46%). **Conclusion:** This is the first study to identify more accurate EKG and monitor characteristics for predicting short-term cardiac outcomes in syncope patients. A more precise definition of abnormal EKG will improve performance of the SFSR. **Keywords:** electrocardiogram, syncope, prediction rule

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FOLLOW-up care and adverse outcomes in a population-based cohort of 799 454 emergency department patients who left without being seen

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Introduction: Relatively little is known about adverse outcomes and subsequent use of medical care by patients who leave the emergency department (ED) without being seen (LWBS). We describe these for a large population-based cohort of LWBS patients. **Methods:** Using administrative databases representing all EDs in Ontario, Canada over 5 years (fiscal years 2003–2007), we linked records of LWBS ED patients with their subsequent office and ED visits, hospitalizations, and deaths to describe use of care (primary care visits, ED revisits) and adverse outcomes (hospitalization or death) within 7 days of LWBS visit. **Results:** There were 799 454 LWBS visits in the 189 EDs over the study period. The overall LWBS rate was 3.5%, with a small increase from 3.2% in 2003 to 3.9% in 2007. The average rate was lowest (1.8%) in small rural hospitals, and highest (4.1%) in adult teaching hospitals. The largest group were young adults (40.3% were 18–39 yr), with 7.6% > 65 yr, and 2.5% < 1 yr; 51.0% were female. The top 3 chief complaints were abdominal/pelvic pain (9.4%), throat and chest pain (4.2%) and fever (4.1%). Subsequent care and adverse events in next 7 days was as follows: 35.1% saw a primary care doctor, 18.2% revisited the ED (5% with a higher acuity triage score); 2.0% were admitted to hospital (n = 16 079) or died (n = 318). Adverse event rates were lowest in pediatric teaching hospitals (1.1%), and highest in adult teaching hospitals (2.5%) **Conclusion:** This is the largest study of LWBS outcomes yet published. Although the LWBS rate in Ontario EDs has increased only slightly in 5 years, this represents a large number of patients. In the 7 days following a LWBS visit, about 1 in 3 patients see a primary care doctor and only 1 in 6 return to the ED, suggesting most do not rapidly re-access health care, while 1 in 50 is admitted to hospital or dies. The extent to which these adverse events are avoidable requires further research. **Keywords:** left without being seen (LWBS), administrative database, adverse outcomes

Winner of the CAEP Resident Research Abstract Award

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INTERPRETATION errors of CT scans by radiology trainees and their clinical consequences: a systematic review

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Introduction: This study aimed to review the published reports of CT interpretation error rates by radiology trainees and their clinical consequences on patient care. The outcomes of interest were the overall interpretation error rates, the potential to change patient care management, actual adverse clinical outcomes resulting from errors, and stratification of error rate by level of training. **Methods:** An electronic search of the published literature was conducted using the PubMed, CINAHL and OVID databases. Abstracts, article reference lists and meetings proceedings were also manually searched. Relevant data was abstracted for outcomes above. **Results:** Eleven published studies met the inclusion criteria for this review, representing 44 527 patient scans (58% were CT scans of the head). There were 1499 major interpretation errors (3.4%, 95% CI 3.2%–3.6%) that had the potential to change patient management. Of the studies that reported patient management changes, there were 94 changes (0.3%, 95% CI 0.2%–0.4%). There were 2 adverse patient outcomes reported (0.007%). Senior residents (PGY 3,4,5) made more errors (14.3%, 95% CI 11.7%–16.9%) than did their junior (PGY1,2) counterparts (2.3%, 95% CI 2.1%–2.5%). The number-needed-to-harm for adverse outcome was NNH = 14 285. **Conclusion:** This systematic review suggests that although radiology trainees make errors in interpreting CT scans, the subsequent rate of patient management change and adverse clinical outcome is low. The error rate was higher among senior radiology trainees compared to junior trainees, for reasons not reported. The included studies are limited by variable reporting rates for all outcomes of interest for this study. These results could have significant patient care implications for emergency medicine and other clinical practitioners in academic teaching centres. **Keywords:** interpretation errors, CT scan, systematic review

Winner of the CAEP Resident Research Abstract Award

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EXPERIENCE and safety using ketamine: a prospective review of the use of ketamine to facilitate endotracheal intubation in the helicopter emergency medical services (HEMS) setting

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Introduction: Ketamine is a dissociative anesthetic used for sedation and facilitation of intubation in various clinical settings. Despite its proven hemodynamic safety, ketamine has not been widely used in prehospital medicine. This study examined the use and safety of ketamine in helicopter emergency medical services (HEMS). **Methods:** This prospective cohort study enrolled all patients transported by a single HEMS program in whom ketamine was used to facilitate intubation. Chart reviews were completed using standard forms by 2 independent trained research staff. Demographics, medical condition, intubation conditions, vital signs (prior to drug administration and also post intubation), and complications were recorded. Proportions, medians, and interquartile ranges (IQR) are reported; differences were compared using M-W and χ^2 tests, as appropriate. **Results:** During the 2.5-year study period, 71 patients received ketamine to facilitate endotracheal intubation. Ketamine was used more in males (51 [72%]) and median age was 49 years (IQR: 31–69). Most patients were adults (70 [99%]) suffering from medical illnesses (42 [59%]); 37 (52%) intubations were performed at the sending hospital and 30 (42%) were performed on scene. Indications for intubation were: to protect the airway (26 [37%]) and failure to oxygenate or ventilate (25 [35%]). The median dose of ketamine was 80 mg (IQR: 60–100; ~ 1 mg/kg); 53 (75%) patients also received a paralytic agent. Median changes in systolic blood pressure (–6 mm Hg; IQR: –24 to 14) and

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heart rate (0 beats/min; IQR: –9 to 6) were small. No differences between head injured and other patients with respect to dose, changes in vital signs and complications were seen. Complications included: 1 (1.4%) interstitial IV, 4 (6%) failed intubations, and 3 (4.2%), cardiac arrests. **Conclusion:** Ketamine is a safe and effective agent in facilitating intubation in a prehospital environment. Complications are similar to use in the controlled ED setting. **Keywords:** ketamine, helicopter EMS, intubation

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DEVELOPMENT of an improved rule to predict short-term serious outcomes in ED patients with syncope

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Introduction: Studies have reported suboptimal performance of the San Francisco Syncope Rule (SFSR) in identifying high-risk syncope patients. We determined the feasibility of developing an improved rule to predict short-term serious outcomes in adult syncope patients. **Methods:** We conducted a health records review for 18 months in a tertiary care ED. We included adults with syncope (sudden transient loss of consciousness with complete recovery) and excluded those with ongoing altered mental status, substance abuse, seizure, head or severe trauma. Trained abstractors collected 135 predictor variables and serious outcomes (65 clinical, 48 EKG, 17 investigation, 5 SFSR). Records were reviewed at all local hospitals and coroner's office for 30-day outcomes. A second blinded EP independently confirmed all outcomes. Analyses included univariate, multivariate logistic regression (LR) and recursive partitioning (RP). **Results:** Of 936 visits screened, 505 met eligibility criteria: female 50.3%, mean age 58.5 years, coronary artery disease 19.6%, hypertension 34.5%, admitted 12.3%. Serious outcomes occurred after 49 (9.7%) visits and included: death 1.0%, procedures to treat cause of syncope 5.7%, cardiac outcomes 5.1%, significant bleeding 1.6%, pulmonary embolism 0.8%. Both LR and RP yielded the same new model: 1) age ≥ 75 years, 2) shortness of breath, 3) lowest systolic BP < 80 mm, 4) BUN > 15 mmol/L, 5) abnormal EKG (or monitor) — any of: nonsinus rhythm, blocks (second or third degree AV, bifascicular, first degree AV with bundle branch), left axis deviation or sinus pause. Comparing the new model to the SFSR, sensitivities were 98.0% (95% CI 90%–100%) v. 89.6% (78%–95%), specificities were 49.6% (49%–50%) v. 39.9% (39%–41%), and areas under the ROC curve were 0.89 v. 0.70, respectively. **Conclusion:** We derived a new model with better accuracy than the SFSR for predicting short-term adverse outcomes in adult syncope patients. This model should be refined and evaluated in prospective studies. **Keywords:** syncope, prediction rule, health records review

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WHAT is the impact of prehospital intubation on survival in patients with moderate to severe traumatic brain injury?

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Introduction: Prehospital intubation is the standard of care for patients with Glasgow Coma Score (GCS) < 9 but some have questioned its usefulness and safety. We compared in-hospital mortality for patients with moderate to severe traumatic brain injury (TBI) who underwent prehospital endotracheal intubation (P-ETI) or emergency department endotracheal intubation (ED-ETI). **Methods:** We studied a prospective cohort of patients from the Ontario Prehospital Advance Life Support — Major Trauma Study who had moderate to severe TBI (defined as head abbreviated injury score ≥ 3) and underwent either P-ETI or ED-ETI. We compared baseline characteristics, prehospital management and outcomes between these 2 groups. For the primary outcome, in-hospital mortality, we calculated unadjusted and adjusted odds ratios (OR). **Results:** We included 306 adult patients from 17 Ontario cities. Baseline characteristics of the P-ETI and ED-ETI groups were: median age 36.0 and 40.0; 64% and 70% male; GCS < 9 93% and 69%; median on-scene systolic BP 90.6 and 116.6; mean injury severity score (ISS) 35 and 31.6; median scene time 20 and 15 minutes; median hospital length of stay 7 and 17 days; mortality 69% and 35%. Independent predictors of mortality included lower GCS, increasing age, ISS and hypotension. We observed a significant association between P-ETI and in-hospital mortality. Unadjusted OR for P-ETI was 3.65 (95% CI 2.0–6.5) ($p \leq 0.0001$). After adjusting for age, gender, injury severity score, head abbreviated injury score, scene GCS and systolic BP, the OR was 2.91 (95% CI 1.5–5.7) ($p = 0.0018$). **Conclusion:** We observed higher in-hospital mortality in patients with moderate to severe TBI who were intubated in the prehospital setting compared to those who were intubated in the emergency department, even after adjusting for potential confounders. Further study is needed to determine the whether this worse outcome is a function of patient selection, prehospital intubation or how the intubation was performed. **Keywords:** traumatic brain injury, intubation, OPALS

Poster presentations

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TEAMWORK training: results of an interinstitutional interdisciplinary collaboration

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Introduction: We conducted a randomized controlled trial of 4 pedagogical methods commonly used to deliver basic teamwork training and measured the effects of each method on the acquisition of student teamwork knowledge, skills, and attitudes. **Methods:** We recruited 203 senior nursing students and 235 fourth-year medical students (total $n = 438$) from 2 major universities for a 1-day interdisciplinary teamwork training course. All participants received an introductory didactic lecture and then were randomly assigned to 1 of 4 educational methods: didactic (control), audience response didactic, role play, and human patient simulation. Student performance was assessed for teamwork attitudes, knowledge and skills before and after the teamwork training using: (a) a 36-item teamwork attitudes instrument (CHIRP), (b) a 12-item teamwork knowledge test, (c) a 10-item standardized patient (SP) evaluation of student teamwork skills performance, and (d) a 10-item modification of items from the Malec et al. (2007) Mayo High Performance Teamwork Scale (HPTS). **Results:** All 4 cohorts demonstrated improvement in teamwork attitudes (F1, 370 = 48.7, $p = 0.001$) and knowledge (F1, 353 = 87.3, $p = 0.001$) pre- to posttest. No pedagogical method appeared superior for attitude (F3, 370 = 0.325, $p = 0.808$). or knowledge (F3, 353 = 0.382, $p = 0.766$) acquisition. Teamwork skills were unchanged for all methods (F3, 18 = 2.12, $p = 0.134$). **Conclusion:** Each of the 4 modalities demonstrated significantly improved teamwork knowledge and attitudes but no modality was demonstrated to be superior. Acurate measurement of teamwork skill continues to prove difficult. Institutions should feel free to utilize educational modalities which are best supported by their resources to deliver basic interdisciplinary teamwork training. **Keywords:** teamwork, interdisciplinary education, randomized controlled trial

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EMERGENCY physician recognition of drug-related visits to the emergency department

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Introduction: Adverse drug related events (ADREs) are a common cause of emergency department (ED) visits. Our objective was to determine the proportion of drug-related visits (DRVs) that emergency physicians (EPs) associate with a medication-related problem. **Methods:** This prospective observational study enrolled adults presenting to a tertiary care ED over 12 weeks. DRVs were defined as ED visits caused by ADREs. Clinical pharmacists (CPs) evaluated all patients for DRVs using validated assessment algorithms. Inter-rater agreement between CPs was measured using kappa scores. EPs blinded to the CP opinion, were then interviewed to determine whether they deemed the ED visit to be medication-related. An independent committee reviewed and adjudicated all discordant cases. The primary outcome was the proportion of DRVs felt to be medication-related by EPs. **Results:** Nine-hundred forty-four patients were enrolled of which 116 (12.3%, 95% CI 10.3%–14.5%) were diagnosed with a DRV. Inter-rater reliability for the determination of DRVs by CPs was 0.86, 0.64 and 0.67 for the 3 pairs. EPs deemed 74 of 116 DRVs (63.8%; 95% confidence interval [CI] 54.7%–72.0%) medication related, 25 not medication related (21.6%, 95% CI 15.1%–29.9%), and 17 as uncertain (14.7%, 95% CI 9.4%–22.2%). Thirty-eight of 42 (90.5%, 95% CI 77.9%–9.1%) DRVs not considered to be medication related by EPs were moderate or severe, requiring a change in therapy, diagnostic procedure or hospital admission. Twenty-eight (66.7%, 95% CI 51.5%–79.0%) were thought to have been preventable. The proportion of DRVs felt to be medication related by EPs was the same for adverse drug reactions as for other classes of ADREs. **Conclusion:** A significant proportion of DRVs, many of which require an intervention or change in therapy, were not deemed to be medication-related by EPs. Further research is warranted to better understand the reasons for this, and whether interventions could improve patient care for these patients. **Keywords:** physician recognition, adverse drug related events, drug-related visits

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BARRIERS to and incentives for emergency department patient safety event reporting

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Introduction: An effective process for reporting and learning from safety events may improve patient safety through identication of patterns of failure. We interviewed frontline ED nurses and nurse managers with a goal of understanding barriers to and incentives for effective safety event reporting and learning. **Methods:** Consenting participants completed sections of the Hospital Survey on Patient Safety Culture (HSPSC) pertaining to incident reporting and organizational response. Participants discussed their responses in semi structured telephone interviews which were recorded, transcribed, and iteratively analysed for emergent patterns and themes pertaining to safety event reporting. **Results:** Fourteen interviews were completed with staff members from urban and rural ED's. Barriers to and incentives for reporting were identified. Barriers included: 1) Time conflict between clinical workload and event reporting paperwork. 2) Fear of reprisal from managers or colleagues (being seen as a complainer, a tattletale, or as careless or unsafe). 3) A sense of futility (no one listens, nothing changes). 4) A culture that discourages reporting (e.g., managers view reports as directed against them). Incentives included: 1) Positive feedback (email, newsletters, posters, staff meetings, individual verbal feedback) and visible changes (e.g., increased staffing, changes to the physical plant or medication cabinet) resulting from reporting. 2) Availability of multiple methods for reporting patient safety events and concerns (flipcharts, anonymous notes, informal verbal reporting, safety huddles, executive walk arounds). 3) A culture that actively promotes reporting as a tool for change (managers perceived as connected and effective). **Conclusion:** We have identified barriers to and incentives for ED patient safety event reporting. Access and ease of reporting for staff, timely feedback, and lesson sharing, are important factors to consider in the development of more effective procedures for ED incident reporting and response. Funding: CPSI. **Keywords:** patient safety, event reporting, qualitative research

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DOES a sample for peripheral serum lactate need to be taken without a tourniquet?

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Introduction: Peripheral venous lactate is routinely acquired by venipuncture without a tourniquet, despite little support for this practice in the literature. Taking samples without a tourniquet is often more time-consuming and painful for the patient. Our objective was to determine whether peripheral venous lactate acquired with or without a tourniquet are equivalent. **Methods:** All emergency department (ED) patients requiring a lactate during a 6-month period were studied. ED nurses collected a sample of blood without a tourniquet for lactate analysis according to the accepted standard (T–). A second sample sent for electrolytes was taken with a tourniquet. This also had lactate measured (T +). Both samples were obtained as closely together as possible and both serum lactates (mmol/L) were measured on the same analyzer. Determination of equivalency was made using 2 methods: mean difference (T + –T–) within 0 ± 0.5; and mean ratio (T + :T–) within 100% ± 10%. Subgroup analyses were performed on patients with lactate < 2 and ≥ 2. Summary statistics and 95% confidence intervals were calculated. **Results:** In total, 629 paired samples were analyzed, 445 samples < 2 and 184 ≥ 2. The mean of the differences of all paired samples is 0.04 (95% CI 0.02–0.06). The mean ratio is 1.03 (95% CI 0.97–1.09). The powers for the 2 tests are 99% and 83% respectively. Subgroup analyses showed similar results. Using the mean difference method, equivalency was seen in 98% of the < 2 group, 95% of the ≥ 2 group and 97% overall. Using the mean ratio method, equivalency was seen in 61% of the < 2 group, 83% of the ≥ 2 group and 68% overall. **Conclusion:** The results demonstrate a high degree of equivalency, greater using the mean difference of 0.5 as compared to the 10% difference in ratio. Lactate acquired with a tourniquet can be used in place of a lactate acquired without a tourniquet, without a clinically significant difference in results. **Keywords:** serum lactate, tourniquet, venipuncture

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GENDER differences in clinical presentation and outcomes in emergency department patients with nontraumatic chest pain

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Objective: Current literature suggests that gender differences in management exist in emergency department (ED) patients with nontraumatic chest pain. We assess gender differences in clinical presentation and outcomes and measure the association between female gender and an adverse cardiac event within 30 days. **Methods:** This prospective cohort study conducted in a tertiary care ED enrolled

patients over 24 years of age with a primary complaint of chest pain over a 9-month period. Exclusion criteria were: acute ST-segment elevation, hemodynamic instability (SBP < 90 mm Hg, HR < 50 or > 100 bpm), cocaine use, terminal noncardiac illness, or pregnancy. On-duty physicians collected clinical variables on a standardized data collection form prior to diagnostic testing. The primary outcome was acute myocardial infarction, revascularization, or death of cardiac or unknown cause within 30 days. Analyses included descriptive statistics, univariate analysis, and multivariate logistic regression. **Results:** We enrolled 970 patients. Patient characteristics included: mean age 59.5 years, 39.8% female, 17.6% history of diabetes, and 39.6% history of ischemic heart disease. One-hundred seventeen (12.1%, 95% CI 10.1%–14.3%) patients experienced an adverse cardiac event within 30 days. Females had a lower prevalence of ischemic heart disease (12.7% v. 26.9%, $p < 0.01$) and less frequently experienced an adverse cardiac event (2.9% v. 9.2%, $p < 0.01$). Clinicians considered the pain to be cardiac in etiology less frequently in females (14.8% v. 27.5%, $p < 0.01$). After adjusting for age, history of diabetes, history of ischemic heart disease, and smoking, females were 51% less likely to experience an adverse cardiac event (OR 0.49, 95% CI 0.29–0.85). **Conclusion:** We identify important gender differences in clinical presentation and outcomes in ED patients with nontraumatic chest pain. These differences may account, in part, for perceived gender disparities in the acute management of chest pain. **Keywords:** gender, outcomes, nontraumatic chest pain

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EPIDEMIOLOGY, risk factors, and outcomes for patients who present to the emergency department with mental health concerns: an 8-year review

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Introduction: Current literature on suicide focuses upon community models. Patients presenting to an emergency department (ED) with mental health concerns have not had risk factors for suicide or long term outcomes evaluated. **Methods:** A retrospective cohort study in an urban, academic emergency department with 62 000 annual visits. All ED patients with mental health complaints between January 1, 2000 and November 1, 2005 were linked with provincial vital statistics data from the same time period to ascertain which patients had committed suicide. Both patients who committed suicide and those who did not were evaluated on predictor variables involving demographics, prior use of health resources, and other mental health or substance-abuse related complaints. **Results:** 9119 patients had 15 000 visits related to mental health or substance misuse. There were 105 (1.15%) deaths attributable to suicide in patients with previous ED visits over the 8-year follow-up period (range 0–2441 days, median 53 days). Only 42 (0.47%) deaths occurred within 30 days of the index visit. Patients who committed suicide were similar to those who did not in terms of age, triage level, homelessness, and prior diagnosis of schizophrenia (all $p > 0.05$) Patients who committed suicide were less likely to be intoxicated (relative risk [RR] 0.2; 95% confidence interval [CI] 0.09–0.46), or have overdosed (RR 0.34; 95% CI 0.23–0.51). Patients who committed suicide were more likely to be male (RR 1.48; 95% CI 1.01–2.24), have used illicit drugs (RR 2.23; 95% CI 1.39–3.58), and to have left the ED without being seen (RR 2.37; 95% CI 1.36–4.14). Patients who committed suicide also had higher rates of ED recidivism and prior hospitalization (Mann–Whitney U test; all p values < 0.01). **Conclusion:** Although 30-day and overall risks of suicide are low, potential exists for EDs to develop strategies to identify mental health patients at higher risk for suicide. **Keywords:** suicide, risk factors, administrative database

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POLICE use of force, injuries and death: prospective evaluation of outcomes for all police use of force/restraint including conducted energy weapons in Calgary, Alberta, Canada

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Introduction: Much controversy surrounds police use of force (UOF) and subsequent outcome. Outcome assessment for UOF is limited by lack of prospective, complete data. **Objective:** To prospectively document the epidemiology of and outcomes for UOF. **Methods:** Prospective, consecutive, observational cohort of all subjects > 18 years old in whom UOF was used from 01/08/2006 until 31/03/08 in Calgary: population 1 042 892. **Primary outcomes:** incidence of UOF, incidence of UOF modalities, descriptive analysis of subjects, incidence of subject injuries including by force modality. 95% CI calculated for all events. **Results:** ~ 685 000 police–public encounters; UOF in 534 individuals (0.08%, CI 0.07–0.08). 488/534 (91.4% CI 88.7–93.6) subjects were male. 70/534 (13.1% CI 10.4–16.3) had normal behavior, 464/534 (86.9% CI 83.7–89.6) were mentally ill, intoxicated (drugs/alcohol) or both. Single UOF modality used in 407/534 (76.2% CI 72.4–79.8); CEW used alone in 139 (26%, CI 22.4–30). 127/534 (23.8%, CI 20.2–27.6) of subjects underwent > 1 UOF modality; CEW used in combination with > 1 other modality in 94/534 (17.6% CI 14.4– 21.1). No firearms were fired. 132/534 (24.7% CI 21.1–28.6) were seen in hospital after UOF: 70/534 (13.1% CI 10.4–16.3) for mental assessment, intoxication or both, not injury. Only 7/534 (1.3% CI 0.5–2.7) were seen in hospital for injury alone, 54/534 (10.1% CI 7.7–13) for injury plus intoxication/mental health, 1 reason unclear. Of injuries seen in hospital, 28/61 (45.9% CI 33.1–59) had CEW as part of UOF. Cohort injury: none/minimal in 436/534 (81.6% CI 78.1–84.8), moderate 85/534 (15.9% CI 12.9–19.3), significant 13/534 (2.4% CI 1.3–4.1). There was no difference in injury rate between modalities, but pepper spray or baton use was infrequent. No deaths followed UOF (0% 97.5 CI 0–0.7). **Conclusion:** UOF by police was rare, involved males in an abnormal state, and was not associated with death or high rates of significant injury. Predictors of death could not be assessed. **Keywords:** use of force, conducted energy weapons, restraints

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FACTORS determining rapidity of administration of opioid analgesia in the emergency department

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Objective: Many patients come to the emergency department because of pain. We sought to explore factors associated with delays to initial parenteral opioid administration in the emergency department. **Methods:** A retrospective cohort study in an urban, academic emergency department with 63 000 annual visits. ED patients presenting between Nov/07–Nov/08 were linked with Omnicell medication dispensing data (Omnicell Inc., Mountain View, CA) from the same period to ascertain which patients had received parenteral opioids. ED opioid medications are only available from the Omnicell machines. We performed a multiple linear regression to predict factors associated with shorter door to opioid dispensing time. Patient records were excluded if data was incomplete, or time to dispense < 300 minutes. **Results:** There were complete data for 4547 patients. 89.3% were given morphine. The mean time to first dispense of opioids was 88.9 minutes (SD 56.8 minutes). No difference was noted for gender, homelessness, CTAS level or ambulance arrival ($p > 0.1$ for all). Based on multiple linear regression, shorter dispensing times were associated with being in the fast track ($p = 0.0005$), younger age

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($p = 0.0015$), and not being admitted to hospital ($p < 0.0001$). Time to MD was significantly associated with time to opioid dispensing. Using 5 categories: < 25 minutes, 25–49 minutes, 50–74 minutes, 75–99 minutes, and > 100 minutes — time to opioid dispensing increased 15.8 minutes ($p < 0.0001$) for each Time to MD category increase. Certain presenting complaints (abdominal pain ($p = 0.002$), back pain ($p = 0.045$), flank pain ($p = 0.006$)) and discharge diagnoses (renal colic ($p < 0.0001$), fractures/dislocations ($p = 0.008$)) were associated with quicker opioid dispensing. **Conclusion:** This represents one of the first studies of analgesia administration times in a Canadian ED. Among the factors associated with delayed dispensing, time to MD is a major determinant of delays to ED opioid analgesia. Nurse initiated analgesia protocols may improve door to opioid administration time. **Keywords:** analgesia, administration time, narcotic analgesia, retrospective cohort

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ANAPHYLACTOID reactions to intravenous acetylcysteine during treatment for acetaminophen poisoning

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Introduction: We describe the frequency and clinical features of anaphylactoid reactions experienced in Canadian patients initiated on the 20-hour intravenous acetylcysteine protocol for acetaminophen poisoning. **Methods:** Data on anaphylactoid reactions were collected as part of a structured medical record review of patients who were initiated on the 20-hour intravenous acetylcysteine protocol for acetaminophen poisoning at one of 34 Canadian hospitals from 1980–2005. Anaphylactoid reactions were classified a priori as cutaneous (urticaria, facial flushing, edema), systemic (respiratory symptoms or hypotension), or both. The acetylcysteine infusion rate at the time of the reaction and the treatment administered were recorded. **Results:** Of 6467 patients initiated on the 20-hour protocol, 536 (8.3%) developed anaphylactoid reactions. 409 (76.3%) patients experienced cutaneous reactions, 41 (7.6%) systemic, 76 (14.2%) both, and 8 (1.5%) patients had a reaction documented but without description of symptoms. 133 patients (24.8%) developed reactions during the initial 150 mg/kg loading dose over 15 to 60 minutes, while an additional 372 (69.4%) did so during the second infusion of 50 mg/kg over 4 hours. Antihistamines were administered in 391 (72.9%) of reactions, beta-agonists (excluding epinephrine) in 46 (8.6%), corticosteroids in 45 (8.4%), and epinephrine in 23 (4.3%). There were no deaths secondary to anaphylactoid reactions. **Conclusion:** In this cohort of Canadian patients initiated on the 20-hour intravenous acetylcysteine protocol for acetaminophen poisoning, most anaphylactoid reactions involved cutaneous clinical features, and most were recognized during either the first or second acetylcysteine dose. Intravenous acetylcysteine remains a safe treatment for acetaminophen poisoning. **Keywords:** acetylcysteine, anaphylactoid reactions, acetaminophen poisoning

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AN EVALUATION of a new emergency medicine clerkship: the first 5 years

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Introduction: In 2003, the Department of Emergency Medicine at the University of Ottawa developed a 4-week emergency medicine clerkship rotation. This new curriculum consisted of 8 learning experiences: clinical shifts, a procedure skills lab, biweekly supervised teaching shifts, an ACLS course, an EMS ride-out, a triage shift, tutorials and preceptor-assisted learning cases (PALS). This study aims to evaluate the various components of the rotation over its first 5 years. **Methods:** All students who completed the emergency rotation from September 2003 to July 2008 were asked to complete an evaluation form at the end of their EM rotation. Each of the 8 learning experiences was evaluated on a 5 point Likert scale, with 1 as unacceptable to 5 as outstanding. Students were also asked to comment on various aspects of the rotation and rate the perceived value and usefulness of this new rotation. **Results:** 433 out of the 515 eligible students (84%) completed an evaluation form. The highest rated learning opportunities were the ACLS course, the clinical shifts, the tutorials, and the procedure skills lab, with mean scores of 4.5, 4.3, 4.2, and 4.1 respectively. The PALS sessions and supervised teaching shifts both had mean scores of 3.9. The triage shift and the EMS ride-out received the lowest overall scores (3.1 and 3.7 respectively). Overall 96% of students rated the new EM clerkship as a very or extremely valuable part of their clerkship and 96% rated the rotation as very or extremely useful to their future medical careers. Finally 94% of students rated their learning experience in the EM clerkship as being stronger or much stronger than other clerkship rotations already completed. **Conclusion:** The new emergency medicine clerkship is highly rated by the third-year students and can serve as a model for other emergency clerkship rotations. The students' high ranking of EM education as compared with other clerkship rotations should encourage all faculties of medicine to include emergency medicine as a core clerkship rotation. **Keywords:** educational research, emergency clerkship, evaluation

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PREDICTORS of delayed hemothorax (DHx) after acute minor thoracic injuries (MTI)

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Introduction: The presence of MTI with or without rib fracture is associated to DHx in nearly 10% of patients. Age and number of fractured ribs were previously suggested as potential predictors. Our objective was to identify predictors of DHx in MTI discharged from the ED. **Methods:** Setting and population: A 2-year prospective cohort study in 2 university-affiliated ED was performed. Patients more than 16 years old with MTI (defined as either abrasion, contusion, suspected rib fracture or confirmed rib fracture) were included. ED chest radiograph was normal or equivalent to previous. Patients were followed at 2, 7 and 14 days following the injuries at an out-patient clinic by physicians to ascertain outcome by radiology. Outcome: Presence of DHx, defined as any appearance of fluid collection on XRay. Data analysis: Multiple logistic regression odds ratio analyses were use to identify predictive variables. The C value was used to test robustness of predictors. **Results:** Four-hundred twenty-nine (429) patients were included and all had complete follow-up. DHx occurred in 52 (12.0%). Age > 65 years and presence of at least one rib fracture were significant predictors, (OR [95% CI]) with 2.98 (1.64–5.41) and 4.03 (2.24–7.25), respectively. All C values where > 0.6. Sensitivity was estimated at 78.9% (0.66–0.88), specificity at 55.8% (0.51–0.61) and positive likelihood ratio at 1.78 (1.48–2.13), when both predictors were present. Projected follow-up proportion was 48.9%. The number of rib fracture was not associated to an increased risk of DHx as previously observed. OR for presence of 2 or more rib fractures was 1.55 (0.73–3.28), and 3.26 (1.35–7.87) for 3 or more. **Conclusion:** Age and rib fractures are predictors of DH in MTI. However, more predictors are needed to obtain appropriate prediction. A robust derivation of a clinical decision rule to orient high-risk patient to limited follow-up resources is suggested. **Keywords:** hemothorax, minor chest trauma, prediction rule

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COPD presentations to emergency departments in Alberta, Canada: a population-based study

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Introduction: COPD is a widespread disease with a growing prevalence of in older adults; exacerbations to the emergency department (ED) are common. The objective of this study was to describe the epidemiology of COPD presentations to EDs made by adults in the province of Alberta, Canada. **Methods:** The Ambulatory Care Classification System of Alberta and provincial administrative databases were used to obtain all ED encounters for COPD during 6 fiscal years (04/99–03/05). Information extracted included demographics, ED visit timing, and outcomes; all data were coded by trained medical records nosologists. Data analysis included descriptive summaries and directly standardized visit rates (DSR). **Results:** There were 85 330 ED visits for acute COPD made by 38 638 distinct adults over the study period. More males (53%) than females presented, and the average age at presentation was 72 years. Most patients (64%) had only 1 COPD-related ED visit during the study; however, 2.3% visited more than 10 times/year. The DSRs have remained stable over the study period 24.4/1000 in 00/01 to 25.6/1000 in 04/05. In 04/05, the Welfare (58.2/1000) and Aboriginal (53.1/1000) DSRs were higher than the Other subsidy (18.1/1000) or nonsubsidy (8.9/1000; $p < 0.001$) groups. The regions with the lowest DSRs had the highest density population (Calgary: 13.9/1000; Edmonton: 20.7/1000). Distinct daily, weekly, and monthly trends were observed. Overall, 67% of ED visits resulted in ED discharge. **Conclusion:** COPD is a common presenting problem in EDs and further study of these trends is required to understand the factors associated with the variation in presentations. The important findings identified here include an overall stable rate of presentation over the study period; however, disparities based on region, age, gender, and socio-economic/cultural status exist. Targeted interventions could be implemented to address specific groups and perhaps reduce COPD-related visits to Alberta EDs. **Keywords:** administrative database, COPD, epidemiological research

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THE OUTCOMES of patients on long-acting beta-agonists prior to ED visits for acute asthma

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Introduction: Acute asthma is a common emergency department (ED) presentation and many evidence-based guidelines exist. With the development of newer treatments, such as long-acting beta-agonists (LABA) combined with inhaled corticosteroids (ICS), ED physicians often encounter patients (pts) with complex treatment regimens. This study examined the outcomes of pts who presented already receiving LABA + ICS. **Methods:** A controlled trial was conducted in 16 Canadian EDs. Pts with physician diagnosis of asthma, age 18–55, and no evidence of COPD were approached if they met physician-based criteria for discharge. Following informed written consent, all pts underwent a structured ED interview and follow-up telephone interview 4 weeks later. At discharge all pts received 7 days of prednisone (50 mg orally daily) and a prescription for anti-inflammatory inhaled was strongly advised. Data were analyzed using χ^2, t test and K-W test. **Results:** Of 788 pts with a detailed pre-ED LABA treatment status, 257 (33%) subjects reported LABA + ICS use prior to their ED presentation. Overall, there were no differences between the LABA + ICS and non-LABA + ICS groups based on demographics. Insurance coverage and primary care provider were higher and ED asthma prescriptions were lower in those on LABA + ICS ($p < 0.015$). ED treatment was similar with almost all patients receiving corticosteroids (98% v. 98%), beta-agonists (62% v. 59%) and anticholinergics (68% v. 67%) in the first hour and IV MgSO4 (0.7% v. 1.7%). Discharge pulmonary functions were similar. Relapse was more common in those receiving LABA + ICS treatment (19% v. 12%; $p = 0.007$) following discharge. **Conclusion:** Patients discharged from the ED with acute asthma who have been receiving LABA + ICS prior to their presentation are increasing and receive similar treatment; however, they have markers of severity that place them at increased risk for relapse. Evidence to guide clinicians in treatment of these patients is lacking and research in this field is urgently required. **Keywords:** asthma, long-acting beta agonists, outcomes

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THE ROLE of abdominal radiography in the diagnosis of intussusception when interpreted by pediatric emergency physicians

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Introduction: Abdominal x-rays are usually the initial diagnostic test ordered in cases of suspected pediatric intussusception. **Objective:** Evaluate the sensitivity and specificity of abdominal x-rays in the diagnosis of intussusception, when interpreted by pediatric emergency physicians. **Method:** This was a prospective experimental study. Participants were board certified or eligible pediatric emergency physicians working in a tertiary care pediatric emergency department (ED). Participants evaluated a work module containing the abdominal x-rays of 50 cases of intussusception and 50 controls, matched for age and sex. For each x-ray series, physicians stated whether it increased, decreased or did not affect suspicion of intussusception. The primary outcome was the percentage of cases for which participants stated that the x-ray increased their level of suspicion (sensitivity). Secondary outcomes included the percentage of cases with an x-ray that decreased the suspicion of intussusception (false negative) and specificity defined by the proportion of controls for which the x-rays decreased the likelihood of intussusception. It was estimated that 500 evaluations (50 cases × 10 participants) was necessary for confidence intervals smaller than ± 5% for proportions. **Results:** 14 of the 15 eligible physicians participated in the study. Overall, abdominal x-rays increased the index of suspicion of intussusception in 48% (95% CI 44%–52%) of cases (sensitivity) and 21% (95% CI 18%–24%) of the controls. However, in 11% (95% CI 9%–13%) of cases, the abdominal x-rays were incorrectly interpreted as being reassuring. The specificity was of 21% (95% CI 18%–24%). Individual participants had variable sensitivities (22%–88%) and specificities (0% to 80%). The abdominal x-rays of 41% of cases and 58% of controls were deemed equivocal by physicians. **Conclusion:** Abdominal x-rays have a low sensitivity and specificity for intussusception when interpreted by pediatric emergency physicians. It should not be used to exclude intussusception in the ED. **Keywords:** intussesception, abdominal radiography, emergency physician interpretation

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EFFICACY of a mnemonic to improve knowledge of the Ottawa Ankle and Foot Rule; a randomized controlled trial

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Introduction: A possible explanation for the limited impact of the Ottawa Ankle Rule (OAR) in clinical settings come from a recent study showing that physicians forget items of the OAR. **Objective:** Evaluate the ability of a mnemonic to improve the mid-term knowledge of the OAR. **Methods:** A single blind randomized controlled trial was among all medical students or residents doing a rotation in pediatric emergency medicine in a single setting. Prior

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knowledge of the OAR was measured at baseline through a questionnaire. The intervention was an information sheet providing a mnemonic to remember the OAR while the control group received the classic description of the OAR. Block randomisation (student v. resident) was used. Participant responded to the same questionnaire at the end of rotation (2–3 weeks later). The primary outcome measure was the knowledge of the OAR based on a 23 points evaluation (13 for the ankle items, 10 points for the foot). Responses were evaluated twice at the end of the study by reviewers blinded to the randomisation. Discrepancies in final scores were resolved by consensus. A Student *t* test was performed to compare mean scores using an intention-to-treat approach. **Results:** Among the 171 eligible participants, 81 students and 83 residents participated. Final outcome was measured in 160 (98%). Both groups were similar with regard to baseline characteristics and prior knowledge of the OAR. At the end, knowledge of the OAR drastically improved in both groups (mean total scores 7.1 v. 18.0). It was, however similar among the 2 groups for the ankle items (10.4 v. 11.0; 95% CI for difference: –0.3 to 0.7) and for the foot (7.6 v. 7.6; 95% CI for difference: –0.8 to 0.8). **Conclusion:** Mid-term knowledge of the OAR drastically improved for all participants. The use of the mnemonic was not associated with a better performance of the participants. These results would need to be confirmed on the long-term but they highlight the importance of having a control group for studies evaluating knowledge transfer. **Keywords:** knowledge translation, mnemonic, randomized controlled trial

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DIAGNOSTIC error in emergency medicine: the debiasing effect of cognitive forcing strategies

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Introduction: The objective was to determine the effect of cognitive forcing strategies (CFS) training to decrease diagnostic error among senior medical students during an emergency medicine rotation. **Methods:** This was a prospective, cross-over study with consecutive enrollment. Ethics approval was granted. Fifty-six subjects were exposed to an interactive case-based teaching session on CFS. Subjects were evaluated on 4 satisficing bias computer-based cases (1 near-transfer, 1 far-transfer and 2 "false positive" cases with a single diagnosis) and 2 availability bias cases (near- & far-transfer). Thirty-seven subjects were immediately tested. Nine subjects were tested 1 week later. Data was analyzed using descriptive statistics and a McNemar χ^2 test. Near- v. far-transfer was defined based on the type of diagnostic test. If CFS teaching used an ECG as an example, ECG testing was near-transfer and x-ray testing was far-transfer, and vice versa. **Results:** Satisficing bias — On immediate testing right after instruction, only 64% (near) and 55% (far) of subjects searched for a second diagnosis. The difference between near- and far-transfer was not statistically significant (NS). In the "false positive" cases, a second diagnosis that was not present was identified in 43% of cases. Availability bias — Only 30% (near) and 17% (far) of subjects made the uncommon correct diagnosis. The difference between near- and far-transfer was NS. Delay in testing — When tested 1 week later, only 30% of subjects searched for a second diagnosis in the satisficing bias cases. In the availability bias cases, only 5.5% made the uncommon correct diagnosis. **Conclusion:** This preliminary data suggests that small group teaching to decrease cognitive error is ineffective. Even with immediate testing, cognitive forcing strategies are not employed by a significant proportion of students, and this worsens with delayed testing. Larger studies are required to determine if the identified trends are statistically significant. **Keywords:** diagnostic errors, cognitive forcing strategies, education research

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VALIDATION of the Vancouver Chest Pain Rules in Asian chest pain patients presenting at the emergency department

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Introduction: Emergency department (ED) doctors are constantly facing the dilemma as to admit the correct patient presented with chest discomfort. We aim to assess the performance of the Vancouver Chest Pain rules for Asian patients. **Methods:** This is a prospective cohort study involved 1690 patients attended at the ED Chest Pain Unit in a large urban centre from Aug. 27, 2000 to May 1, 2002. Patients were at least 25 years of age, presenting with stable chest pain and a nondiagnostic ECG, with no history of active coronary artery disease. Outcome measurement: Cardiac events (death, ventricular fibrillation, myocardial infarction, cardiogenic shock or acute pulmonary edema), angioplasty or coronary artery bypass within 30 days of enrolment. **Results:** Three-hundred twelve patients were found to fulfill the Vancouver Chest Pain criteria for early discharge. These were a normal initial ECG, no previous ischemic chest pain, and age younger than 40 years and low-risk pain characteristics were low risk if they had an initial creatine kinase-MB (CK-MB) less than 3.0 microg/L or an initial CK-MB greater than or equal to 3.0 microg/L but no ECG or serum-marker increase at 2 hours. Of those for early discharge, 11 had cardiac events and a further 7 had angioplasty or bypass at 30 days, compared to 111 and 68 respectively for those unsuitable for discharge. This gave the rule a sensitivity of 91% for cardiac events and 90.9% for cardiac events including angioplasty and bypass. Specificity was 19.2% and 19.7% and negative predictive value 96.5% and 94.2% respectively. **Conclusion:** We found the Vancouver Chest Pain rule had fairly high sensitivity and negative predictive value for adverse cardiac events. However a small proportion of patients sent home with early discharge would still have adverse cardiac events. **Keywords:** Vancouver chest pain rule, validation, clinical prediction rule

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PRONE positioning following use of force did not result in fatal outcome even in abnormal subjects: early results from a prospective observational cohort of all use of force in Calgary

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Introduction: Sudden in custody death (SICD) after prone positioning continues to incite debate. Few studies have evaluated prone positioning in actual police use of force/restraint (UOF). **Objective:** To describe the final position of subjects following UOF. To evaluate mortality for subjects proned following UOF. **Methods:** Data from a prospective, consecutive, observational cohort of all subjects > 18 years old in whom UOF was used from 01/08/2006 until 31/03/08 in Calgary. **Outcomes:** subject death and incidence of each position for subjects following physical control — prone, supine, side lying, kneeling or standing. 95% CI were calculated for events; 97.5% CI for all zero events. **Results:** Data for final position available in 531/534 (99.4% CI 98.4–99.9) subjects undergoing UOF. For 3 subjects with missing position data: 1 had abnormal behaviour, 2 were normal, none died. For 531 remaining: 233 were prone (43.9% CI 39.6–48.2), 108 sidelying (20.3% CI 17.0–24.0), 96 sitting (18.1% CI 14.9–21.6), 73 lying face up (13.7% CI 10.9–17), 18 standing (3.4% CI 2.0–5.3) and 3 kneeling (0.6% CI 0.11–1.6) as a final position. 9/233 subjects in the prone position also had leg restraints but leg restraint secured to handcuffs was not encountered in the dataset. Of the individuals

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proned, 199/233 (85.4% CI 80.2–89.7) demonstrated behaviour consistent with mental illness, intoxication with drugs/alcohol, or a combination; 34 of 233 (14.6% CI 10.3–19.8) subjects left in the prone position had normal behavior prior to UOF. No subject died in the prone position (0/233: 0% 97.5% CI 0–1.5%) or in any position (0/531 with known position: 0% 97.5% CI 0–0.7%). **Conclusion:** The prone position was the most common position for subjects following use of force. No subject died proned or in any other position despite a majority of subjects having abnormal behaviour prior. Research surrounding SICD should consider factors other than positioning. **Keywords:** sudden in custody death, use of force, physical restraints

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TREATMENT of acetaminophen poisoning across Canada over a 25-year period

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Introduction: We describe the treatment and outcomes from acetaminophen poisoning in hospitalized patients in Canada from 1980–2005. **Methods:** A structured medical record review of patients with the primary or secondary discharge diagnosis of acetaminophen poisoning at one of 34 hospitals in 8 Canadian cities from 1980–2005 was conducted. The acetylcysteine protocol initially administered to each patient (20-hour intravenous, 48-hour intravenous, or 72-hour oral) was documented. Anaphylactoid reactions were defined as the presence of urticaria, facial flushing, edema, respiratory symptoms or hypotension during the acetylcysteine infusion. Hepatotoxicity was defined as either an aspartate or alanine aminotransferase ≥ 1000 IU/L. Data were grouped into 5-year intervals to study possible trends in acetylcysteine protocol use and clinical outcomes. **Results:** 10 418 patients had a discharge diagnosis of acetaminophen poisoning during the study period; 6931 (66.5%) were treated with acetylcysteine. The 20-hour intravenous protocol was used more commonly (range 81.5%–99.0%) than the 48-hour intravenous (range 0.1%–12.9%) and 72-hour oral (range 0.9%–15%) protocols. Over the 25-year interval, the use of the 20-hour intravenous protocol increased from 32.3% to 68.5% of admitted patients, while the use of the 72-hour oral protocol declined from 19.3% to 0.5%. The rate of hepatotoxicity increased from 2.4% to 11.9%, the frequency of anaphylactoid reactions increased from 2.4% to 6.6%, and the death rate decreased from 3.4% to 1.9%. **Conclusion:** In Canada from 1980–2005, the use of the 20-hour intravenous acetylcysteine protocol became widespread and replaced the other protocols; this was associated with an increased rate of anaphylactoid reactions. A concurrent increase in hepatotoxicity yet decrease in mortality may reflect secular trends in overdose severity, admission practices, and laboratory testing in addition to protocol efficacy. Substantial regional variations in treatment protocols were also observed. **Keywords:** acetaminophen poisoning, environmental scan, hepatotoxicity

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VALIDATION and properties of the verbal numeric scale in children with acute pain

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Objective: To validate the verbal numeric scale (VNS), to evaluate its interchangeability (agreement) with the visual analog scale (VAS), to determine its interpretability, and its test–retest reliability in children with acute pain seen in an emergency department. **Methods:** This was a prospective cohort study of children between 8 and 17 years presenting to a pediatric emergency department (ED) with acute pain. Pain was graded using the VNS, the VAS, and the verbal rating scale (VRS). A second assessment was done before discharge and patients were asked if the pain had changed. We determined a priori that in order to be valid the VNS would need to: correlate with the VAS (criterion validity); decrease after the intervention to reduce pain (construct validity); and be associated with the VRS categories (content validity). The VNS interchangeability with the VAS, its minimal clinically significant difference, and its test–retest reliability were also determined. The VNS was treated as categorical data and nonparametric statistics were used. A sample size of 171 patients was estimated to have 80% power at alpha 0.05 to detect a difference of 0.05 in correlation for the primary outcome, the criterion validity. **Results:** A total of 202 patients (mean age of 12.2 ± 2.6 years) were enrolled during a 5-month period. The VNS correlated well with the VAS: r intraclass = 0.93, $p < 0.001$. There were significant differences in VNS before/after interventions to reduce pain ($p < 0.001$), and between VRS categories (mild v. moderate, and moderate v. severe, both $p < 0.001$). The 95% limits of agreement between VNS/VAS was outside the a priori set limit of ± 2.0: –1.8, 2.5. The VNS minimal clinically significant difference was found to be 1/10. The VNS test–retest bias was 0.2 and the 95% limits of agreement were –0.9, and 1.2. **Conclusion:** The VNS provides a valid and reliable scale to evaluate acute pain in children aged 8 to 17 years with acute pain but is not interchangeable with the VAS. **Keywords:** verbal numeric scale, acute pain, pediatrics

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SEASONALITY patterns in croup presentations by children to Alberta emergency departments

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Introduction: Croup, more formally known as laryngo-tracheobronchitis, is a common pediatric respiratory illness presenting to the emergency department (ED) in winter months. The majority of cases of croup are caused by parainfluenza viruses. We examine the weekly patterns of young children who made croup-related visits to Alberta EDs. **Methods:** ED visits were identified in the Ambulatory Care Classification System database and linked to other provincial administrative databases to obtain all ED encounters for croup made by children (newborn to 2 years old) during 6 fiscal years (04/99 to 03/05). Information extracted included demographics, ED visit timing, and outcomes; all data were coded by trained medical records nosologists. Data analysis included descriptive summaries and directly standardized visit rates (DSRs).A time series model (SARIMA) was developed to capture the trends over time and season of croup-related presentations. This model was also used to make future predictions. **Results:** Overall, 27 355 croup-related visits to Alberta EDs were made during the 6-year study period. More males (62%) than females presented and most were less than 1 year old (43%). Most patients (78%) had only 1 croup-related ED visit during the study (range 1–26). Differences were observed in the number of visits made in odd (more) and even (less) fiscal years. Peak visits occurred in November for odd years and in February for even years. The sex-adjusted DSRs increased slightly from 43/1000 in 99/00 to 50/1000 in 03/04 for odd fiscal years and from 31/1000 in 00/01 to 34/1000 in 04/05 for even years. Seasonalities at 52 weeks and 104 weeks were detected and included in the final SARIMA model. **Conclusion:** We observed the presence of a clear biennual pattern of croup ED visits, with differences between even and odd years. The SARIMA model and predictions offers insight into the epidemiology of croup-related visits to Alberta EDs and may be helpful in planning both research and resource needs. **Keywords:** seasonality patterns, croup, epidemiologic research

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IDENTIFICATION of the predisposing factors for diagnosis errors in the emergency department?

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Introduction: Diagnosis errors (DxE) have been shown to be the most frequent type of errors in the emergency department (ED) with significant consequences for patients. However, DxE remain understudied, resulting in a lack of understanding concerning their predisposing factors. The objective of this study is to examine the association between patient and environmental factors on DxE in the ED. **Methods:** A subgroup case–control analysis was undertaken from a larger study examining factors associated with medical errors (MEs) in the ED, which was conducted in 2 university tertiary EDs (March 2006–June 2008). Suspected MEs detected by several strategies (MD, nurse, pharmacy reports and database queries) were reviewed by a research committee. The committee confirmed 878 MEs of which 173 (20%) were considered to be DxE (cases of current analysis). Controls (n = 242) were a random sample of visits with no errors. Cases and controls were compared on patient and environmental factors (inflow, boarding, occupancy and MD fatigue). Environmental factors were measured within 6 hours of incident time. For cases, incident time is the ME time; for controls, a random point was chosen to represent the pattern of incident time of cases. Data were collected through database and chart review. **Results:** DxE were mainly reported by MDs (n = 148; 86%), and resulted in more admissions (28% v. 14%), consultations (42% v. 26%), imaging tests (71% v. 51%) and longer length of stay (median 9.1 h v. 5.3 h). Multivariate GEE analysis (OR, 95% CI) showed that age 65 yr + (1.27, 1.14–1.41), urgent triage (3.39, 1.96–5.85), MD fatigue (1.14, 1.03–1.26) and number of discharged patients (day shift [0.94, 0.92–0.97]; evening/night shift [1.08, 1.02–1.14]) were significantly associated with DxE. **Conclusion:** Older patients and those with more urgent conditions were more likely to suffer a DxE in the ED. Increased MD fatigue and increased volume of patients discharged during the evening/night shifts also lead to a higher risk of DxE. **Keywords:** diagnostic errors, case control study, risk factors

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DOES having an emergency physician at triage for a 4-hour shift reduce ED length of stay?

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Introduction: An emergency physician (EP) at triage may improve waiting times, emergency department (ED) length of stay and staff satisfaction, while reducing left without being seen (LWBS) rates. Different staffing models have been described, however the optimal model is unknown. We assessed whether having a 4-hour EP at triage shift would reduce length of stay and LWBS rates. **Methods:** The study was conducted in an urban ED (60 000 visits annually). 4-hour shifts were scheduled during peak afternoon hours over a 6-week period, divided into 3 control weeks (no triage EP) alternating with 3 intervention weeks (triage EP present). All patient visits were included. The triage EP managed patients clinically, and assisted with triage and administration. Prospective temporal data and visit rates were extracted from the Emergency Department Information System. Staff satisfaction was recorded on project-specific surveys. **Results:** 5020 visits were included. Groups were similar for age, gender, CTAS score, and daily ED volumes. A triage EP did not reduce mean ED length of stay (triage EP 396 min v. no EP 409 min, p = 0.32) or mean time to see a physician (triage EP 111min v. 112 min, p = 0.61). Overall LWBS rates were reduced (triage EP 5.7% v. 6.3%, ARR 0.6%, RRR 10%, NNT 17). Subgroup analysis of the 4-hour triage EP period demonstrated a very significant reduction in LWBS rates (triage EP 3.1% v. 7.6%, ARR 4.5%, RRR 59%, NNT 3). The majority of physicians surveyed enjoyed the triage shifts, however 46% felt that these shifts should not continue after the study period. The nurses responded more favorably, with 65% preferring the shifts to continue. **Conclusion:** 4-hour shifts at triage are not sufficient to reduce overall ED length of stay, although they reduce the number of patients who leave without being seen. Longer shifts may be required to significantly impact ED length of stay. **Keywords:** emergency physician in triage, ED crowding, LWBS

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LEVELS of burnout and issues perception by emergency department staff

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Introduction: Many emergency physicians, nurses and support staff may exhibit "burnout." This study measured ED staff burnout and perception of causes in an ED with 35 000 visits per year. **Methods:** Thirty-five ED physicians, nurses and support staff performed a Maslach Burnout Inventory survey, a validated tool with 3 subscales: Emotional Exhaustion (emotionally overextended and exhausted); Depersonalization (unfeeling and impersonal response toward care recipients); and Personal Accomplishment (feelings of competence and successful achievement). The opposite is engagement with one's work: low emotional exhaustion, low depersonalization and high personal accomplishment. Problems focus groups were held with 21 staff. The survey results and focus groups were administered by an independent consultant. **Results:** 74% of staff felt a sense of personal accomplishment from their work in the medium to high range, 83% are in the medium to high range of emotional exhaustion and 80% are in the medium to high range of depersonalization (Personal Accomplishment: low, 26%; medium, 37%; high, 37%; Emotional Exhaustion: low, 17%; medium, 20%; high, 63%; Depersonalization: low, 20%; medium, 23%; high, 57%). Focus groups identified 4 problem areas: 1) admitted patients retained in the ED; 2) lack of experienced nurses; 3) unhelpful managers; 4) communication problems within the ED, with other units, and with senior management. **Conclusion:** A majority showed feelings of emotional exhaustion, and believed themselves to be unfeeling and impersonal toward patients. Depersonalization is detrimental because engagement with patients is part of the reward for ED staff. Communication issues exacerbate feelings of lack of support. Experienced staff who are exhausted and disengaged may be lost to the ED, with cyclical, worsening retention. Intervention is thus vital to retain qualified and experienced ED physicians, nurses and support staff. **Keywords:** burnout, survey research, depersonalization

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WHEN conducted energy weapons are combined with other force options: When does it happen and is it fatal?

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Introduction: Criticism surrounds conducted energy weapons (CEW) use, particularly in combination with other use of force (UOF) and in abnormal subjects. **Objective:** To explore situations in which CEW was used as one of multiple force options (MF). Outcome of interest: subject death. 95% CI calculated for all events, one-sided 97.5% CI for all zero events. **Methods:** Prospective, consecutive, observational cohort of all subjects > 18 years old undergoing UOF from 01/08/2006 until 31/03/08 in Calgary: population 1 042 892. All Calgary Police Service officers carry CEW (Taser X26) **Results:** UOF occurred in 534 of ~ 685 000 encounters

(0.08% CI 0.07–0.08). Subjects were male (91.4%), most (86.9%) were mentally ill, intoxicated (drugs/alcohol) or both. 127/534 (23.8%, CI 20.2–27.6) subjects underwent > 1 UOF; CEW was used with other UOF in 94/127 (74% CI 65.5–81.4). For MF events including CEW, order of progression unknown in 1. In 3/94 (3.2% CI 0.7–9) events, CEW subdued initially but struggle led to UOF in the handcuffed subject. CEW was used as final UOF in 66/94 (70.2% CI 59.9–79.2) MF involving CEW. CEW was used as first UOF in 24/94 (25.5% CI 19.9–38.9) MF involving CEW. If CEW was final UOF (n = 66) it followed stuns/strikes in 51, CS gas in 1, firearm ready/pointed in 6, strikes/stuns plus baton in 4, baton only in 4. If CEW was first (n = 24): 3 probes missed, 1 probe failed re: thick clothes, 1 pulled probes out, 9 probe deployments did not subdue; 4 drive stuns did not subdue, 6 subjects had vascular neck restraint after CEW. No subjects died following MF involving CEW: 0/94 (97.5% CI 0,3,8) No subjects died in any UOF (0/534 97.5% CI 0–0.7). **Conclusion:** Use of multiple force options occurred in ~ 24% of use of force events, of those CEW was combined in 74%. No deaths occurred despite an abnormal population. **Keywords:** conducted energy weapons, use of force, mortality

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QUANTITATIVE results from an Ontario hospital patient flow improvement program pilot to improve emergency department waiting times

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Introduction: Ontario adopted an emergency department (ED) strategy to reduce waiting times which includes a patient flow improvement program. A pilot version was tested at a large community hospital and evaluated quantitatively to determine the effect of the program on reducing emergency department waiting times. **Methods:** A pre–post evaluation compared institutional ED data from the pilot hospital from July–November 2007 (pre), December 2007–March 2008 (intervention), and April–June 2008 (post). All patients registered in the emergency department during the study period were included. Results are reported with a focus to the proportion of patients meeting the Ontario Ministry of Health ED waiting time (defined as total time in the ED) targets specific for their level of acuity (high < 6 h; medium < 8 h; low < 4 h). **Results:** The ED census at the pilot hospital was 66 336 patient visits for the year under study. Across pre-, peri- and postintervention periods, the admission rate was similar (14% v. 14%; 13%). The 90th percentile time to physician initial assessment (h) for patient acuity groups postintervention was 3.5; 3.8; and 2.8 v. 3.5; 3.5; 2.8 at baseline. Nintieth percentile ED-LOS (h) was (14.8, 8.1, 4.5 v. 14.8; 7.8; 4.6). Overall, the majority of ED visits across patient groups were within the MOH ED-LOS targets (77.9%, 82.5%; 86.7%) at baseline, with no observable change in the proportion of overall (78.7%, 82.1%; 85.6%) and admitted patients (42.5 v. 42.5; 19.8 v. 20.25; 19.7 v. 18.6) within ED-LOS targets following the pilot intervention. Statistical trends are reported. **Conclusion:** Results suggest no substantive increase in the proportion of patients meeting ED length of stay targets 3 months following the pilot intervention. The evaluative approach requires substantive longitudinal data and an increased period of follow-up to effectively examine statistical trends to account for known seasonal variation and institutional factors. **Keywords:** Ontario ED waiting time strategy, ED crowding, pre–post evaluation

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EPIDEMIOLOGY of out-of-hospital post trauma cardiac arrest in children

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Introduction: To determine the epidemiology and survival of pediatric out-of-hospital cardiac arrest (OHCA) secondary to trauma. **Methods:** This was a prospective, multicentre, observational study. Data was collected from EMS, fire, and inpatient records of all OHCA secondary to trauma in patients aged ≤ 18 years from 2000 to 2003 in 36 urban and suburban communities. Data was collected for a 1-year period from each site. Eligible patients were apneic, pulseless and received CPR in the field. Primary outcome was survival to discharge. **Results:** The study included 123 patients. Median age was 7.3 years (IQR 6.0–17.0). Patients were 78.1% male; 59.0% African American, 20.5% Hispanic, and 15.7% white. Most arrests occurred in residential (47.1%) or street/highway (37.2%) locations. Initial recorded rhythms were asystole (58.4%), pulseless electrical activity (29.2%), and ventricular fibrillation/tachycardia (3.4%). The majority of arrests were unwitnessed (52.9%) and less than 20% of cases received chest compressions by bystanders. The median call-to-arrival interval was 4.9 minutes and the on-scene interval was 12.3 minutes. Blunt and penetrating traumas were the most common trauma mechanisms (34.2% and 25.2%, respectively) and had poor survival-to-discharge (2.4% and 6.5%, respectively). For all OHCA, 19.5% experienced ROSC in the field, 9.8% survived the first 24 hours, and 5.7% survived to discharge. Survivors had triple the rate of bystander CPR than nonsurvivors (42.9% v. 13.8%). Unlike blunt trauma or strangulation/hanging, most patients who survived the first 24 hours after penetrating trauma or drowning were discharged alive. Drowning (17.1% of arrests) had the highest survival-to-discharge rate (19.1%). **Conclusion:** The overall survival rate for OHCA in children after trauma was low, but some trauma mechanisms have better survival rates than others. Most OHCA in children is preventable and education and prevention strategies should focus on those over-represented populations and high-risk mechanisms to improve mortality. **Keywords:** prehospital, posttraumatic cardiac arrest, pediatrics

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A NEEDS assessment to determine the essential elements of in-hospital resuscitation knowledge and skills for resident physicians

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Introduction: While emergency physicians initially resuscitate patients arriving at a hospital, resident physicians attend the majority of in-hospital resuscitations. The objective of this study was to perform a formal needs assessment establishing essential in-hospital resuscitation knowledge and skill sets for resident physicians. **Methods:** All cardiologists, intensivists, and internal medicine attending staff at 4 teaching hospitals were electronically surveyed using a modified Dillman method in a blinded fashion. A broad list of knowledge and skill sets was gathered from recent resuscitation guidelines. Using a 6-point Likert scale, respondents ranked items in terms of importance for in-hospital resuscitation. Responses were collated using descriptive statistics, including median and interquartile ranges for each domain surveyed. Institutional ethics approval was granted. **Results:** The response rate was 75% (n = 93) with the majority (52%) of respondents internal medicine attendings. The top 5 resuscitation knowledge sets (in order) were: cardiac rhythm assessment, discussion of code status, delivery of bad news, management of wide complex tachycardia, and management of bradycardia. The top 5 resuscitation skills (in order) were: cardiac defibrillation, airway assessment, bag-mask ventilation, central venous access, and synchronized cardioversion. The bottom 5 resuscitation knowledge sets (in order)

were: whole bowel irrigation for GI decontamination, neuromuscular blockade for intubation, ventilator management, charcoal for GI decontamination, and procedural sedation. The bottom 5 resuscitation skills (in order) were: open cardiac massage, cricothyrotomy, compartment pressure measurement, tube thoracostomy, and gastric lavage. **Conclusion:** This study has prioritized in-hospital resuscitation knowledge and skill sets. Resuscitation education for resident physicians should be tailored by these findings, particularly as they attend the majority of in-hospital resuscitations in teaching institutions. **Keywords:** resuscitation, needs assessment, educational research

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COMPARATIVE performance of emergency physicians and clinical pharmacists in evaluating patients for drug-related ED visits

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Introduction: Adverse drug-related events (ADREs) cause approximately 12% of ED visits. Our objective was to determine how emergency physicians (EPs) and clinical pharmacists (CPs) compare in attributing drug-related ED visits (DRVs) to medication-related problems. **Methods:** This prospective study enrolled adults presenting to a tertiary care ED over 12 weeks. DRVs were defined as visits caused by ADREs. CPs evaluated patients for DRV using validated assessment algorithms in the ED. EPs, blinded to CP assessment, evaluated patients in their standard manner and indicated whether they believed the visit was medication-related at the end of their shift by face to face interview. CPs followed up patients in whom they were uncertain until after ED or hospital discharge, and made final assessments after completion of follow-up. An independent committee reviewed and adjudicated all cases in which the EPs' and the final CPs' assessments were discordant. The primary outcomes were the proportion of DRVs attributed to a medication-related problem by CPs and EPs at the point of care. **Results:** EPs and CPs simultaneously evaluated 725 patients for DRV, of whom 96 were diagnosed with a DRV (13.2%, 95% CI 11.0%–15.9%). At the end of the ED visit CPs correctly attributed 67.7% (65/96, 95% CI 57.8%–76.2%) of DRVs to a medication-related problem, remained uncertain in 19.8% (19/96, 95% CI 13.0–28.9) and missed 12.5% (12/96, 95% CI 7.3–20.6). EPs correctly attributed 63.5% (61/96 95% CI 53.5%–72.5%) of DRVs to a medication-related problem, remained uncertain in 14.6% (14/96, 95% CI 8.9–23.0), and missed 21.9% (21/96, 95% CI 14.8–31.1). Thirteen DRVs were only identified by CPs, and 7 only by EPs. **Conclusion:** CPs and EPs attribute a similar proportion of DRVs to medication-related problems at the point of care. Both groups signal events as DRVs that are not attributed by the other rater. Further research to optimize the identification and care of patients with medication-related problems is warranted. **Keywords:** drug-related visits, emergency physician recognition, pharmacists

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CANADIAN children have outgrown the Broselow Tape

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Introduction: The color bar coded Broselow Tape (BT) informs emergency physicians of medication dosages to perform emergency resuscitation on children. There is a worldwide pandemic of childhood obesity that could result in significant underestimation of body weight and thus under-dosing of essential medications. The objective of this study was to validate the BT as a tool for estimating patient weight in Canadian children. **Methods:** After obtaining ethics approval, 5093 children between 0.1 to 11.1 years attending the ED and different clinics at a tertiary care centre were measured for height and weight, using standard precision scales and stadiometers. The predicted weight from the BT was analyzed against the actual weight using Spearman rank correlation analysis and Bland and Altman analysis for agreement. **Results:** In the entire group, 46.2% of patients were females. The median age was 3.8 years. Median weight was 16.5 kg, and median height was 100.9 cm. The median Broselow weight was 15.0 kg. While there was good correlation between the Broselow weight and the actual weight ($r = 0.952$, $p < 0.0001$), there was a significant bias of 7.73% with a standard deviation of 17.88% (95% CI –27.32% to 42.79%). Only 54.0% of estimated weights were within 10% error, 82.5% within 20% error and 93.1% were within 30 percent error. **Conclusion:** The results suggest that the current Broselow Tape underestimates the actual weight of Canadian children. **Keywords:** Broselow Tape, resuscitation, pediatrics

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A CONTROLLED clinical trial of a system-wide, multifaceted strategy to reduce overcrowding: Impact on health services outcomes

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Introduction: Emergency department (ED) overcrowding is a growing Canadian health care crisis and disproportionately impacts large volume, urban and teaching hospitals. In 2006, our region initiated the Emergency Solutions and System Capacity (ESSC) project to address overcrowding and patient-flow issues. This study was designed to examine the effect of the ESSC strategy on accepted overcrowding markers. **Methods:** The ESSC project is a 15-intervention strategy iteratively developed in 2006 and initially implemented in January 2007. Two academic and 2 community EDs in the Capital Health Region of Alberta were selected to receive the ESSC implementation. The primary health services outcomes of interest were median and 90th percentile length of stay for admitted and discharged patients, the proportion of patients leaving without being seen (LWBS), and emergency in-patient (EIP) times. ED information was collected prospectively during the study period using data from the computerized emergency department information system (EDIS) tracking program at each site. Descriptive statistics are provided on a 6-month basis; due to the large sample size statistical testing was replaced with benchmark target achievement. **Results:** Over the first 18 months of the study, approximately 67% of the interventions were initiated. Findings indicate that the ESSC EDs experienced approximately the same ED volume, acuity and % admissions over the study period. Overall, median LOS for all ED pts has increased from 4.1 to 4.9 hours. Median LOS for EIP patients has increased from 20.6 to 22.6 hours. While percentages of LWBS have fluctuated, the proportion has increased from 7.1% to 8.0% over the study. **Conclusion:** To date, the ESSC does not appear to have improved ED crowding measures; moreover, there is evidence that care delays have increased for admitted patients. Further evaluation of quality of care, safety and patient satisfaction in these EDs is ongoing and qualitative work is planned to identify "lessons learned." **Keywords:** ED crowding, Emergency Solutions and Systems Capacity Project, multifaceted strategies

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EMERGENCY medical dispatch communication with callers may identify critical pediatric calls amenable to just-in-time assistance

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Introduction: Prearrival instruction for callers or "just-in-time"

prompts for EMS may improve care for critical pediatric patients. To determine whether info obtained during 911 calls can identify pediatric patients amenable to prearrival assistance. **Methods:** Prospective cohort of consecutive, emergent ("lights and sirens") transports, < 18 years in Wake County, pop. 815 000. Data was from dispatch recordings and electronic ambulance reports. Excluded were "walk-ins" to EMS/fire station or called from police radio. Caller composure was rated on a validated emotional content scale. Univariate testing was used to compare dispatch audio factors to need for emergent EMS procedures (i.e., airway support, compressions/ventilation, needle thoracostomy, aerosol treatment, fluid bolus, blood transfusion). **Results:** Among 205 eligible patients, 163 (82%) had complete data. Patients were 58% male, median age 6 years (IQR 2–15), 68% located at a private residence, 33% on a street/road/highway, median call receipt to EMS arrival 7 minutes (IQR 5–9) and on-scene interval 9 minutes (IQR 6–14). Characteristics amenable to prearrival instructions included: caller was relative/friend/self 47%, reasonably calm 74%, using cell phone 33%, within 15 feet of patient 69%, health care provider on scene 17%. Prearrival instruction would be impeded in 24% of calls due to: technical difficulties 14%, language difference 7%, > 50 feet from patient and not on cell phone 7%, and speech/hearing impaired 1%. Prearrival CPR instructions were provided for all apneic and/or pulseless patients (12%). Emergent EMS procedures were performed in 67% of cohort. Dispatch factors related to emergent EMS procedures were: unresponsive 100%, not breathing 100%, no pulse 100%, toxic ingestion 100%; breathing difficulty 92%; seizure 82%; trauma etiology 64%. **Conclusion:** Most pediatric 911 calls are conducive to prearrival instructions for callers or "just-in-time" reminders for EMS. More directed clinical questions may improve recognition of patients requiring critical EMS interventions. **Keywords:** emergency medical dispatch, 911, just-in-time assistance

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INSULIN therapy for calcium channel blocker toxicity — a North American Poison Centre Survey

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Introduction: Calcium channel blocker (CCB) toxicity is a leading cause of in-hospital death following overdose in North America. None of the various therapeutic approaches including high-dose insulin has been studied in a controlled trial. To help design such a trial, we sought to describe current poison centre recommendations. **Methods:** After pilot testing, a 14-item questionnaire was emailed to the medical directors of U.S. and Canadian poison centres in February 2008. Respondents were also asked to provide any written high-dose insulin protocol in use at their centre to independently verify responses. **Results:** Medical directors of 18 poison centres (16 United States, 2 Canada; catchment population c. 140 million) responded to the survey. Nearly all (17/18) respondents had "ever recommended" high dose insulin therapy for CCB overdose, mostly based on an appropriate history and hypotension (12/17) especially if refractory to fluid and calcium (11/17) with few contraindications (hypoglycaemia 5/17). Activated charcoal, intravenous calcium and glucagon were also recommended by nearly all respondents. We observed large variation in dosing and cointerventions for severe toxicity (systolic of 60 mm Hg).The initial insulin bolus ranged from 0.1 to 10 U/kg IV, followed by an infusion of between 0.1 and 10 U/kg/h. Recommended GI decontamination (whole bowel 11, multidose charcoal 6, lavage 5) also varied widely, as did coadministration of dextrose (7.5 to 75 g/h), and frequency of capillary blood glucose and serum potassium testing. Many recommended extracorporeal circulatory support in refractory cases (intra-aortic balloon pump [IABP] 12, cardiopulmonary bypass [CPB] 10). **Conclusion:** While the majority of North American poison centre directors recommend high dose insulin for suspected CCB overdose, there is large variation in dosing spanning 2 orders of magnitude. While a placebo-controlled trial of insulin may no longer be feasible, these findings support a dose-finding clinical trial within this range. **Keywords:** calcium channel blocker toxicity, poison control centres, survey research

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COMPARISON of the 20-hour intravenous and 72-hour oral acetylcysteine protocols for the treatment of acute acetaminophen poisoning

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Introduction: The optimal dose, route, and duration of acetylcysteine therapy for prevention of hepatic injury after acute acetaminophen poisoning remain unclear. **Methods:** We conducted a structured medical record review of 2086 patients admitted for acetaminophen poisoning in whom the 20-hour intravenous acetylcysteine regimen was initiated between 4–24 hours postingestion at one of 34 Canadian hospitals from 1980 to 2005. Their outcomes were compared to a historical cohort of 1962 comparable patients treated in United States hospitals with 72 hours of oral acetylcysteine from 1976 to 1985. In both countries, the participating hospitals included community, tertiary, adult, pediatric, and transplant centres. The primary outcome was hepatotoxicity, defined as aminotransferases ≥ 1000 IU/L. **Results:** The incidence of hepatotoxicity was 13.9% in the 20-hour group and 15.8% in the 72-hour group (–1.9% absolute difference, 95% confidence interval [CI] –4.2 to 0.3). When acetylcysteine was initiated before 12 hours postingestion, the relative risk (RR) of hepatotoxicity was significantly lower in the 20-hour group (RR 0.54, 95% CI 0.38–0.75 at 4 hours; RR 0.84, 95% CI 0.71–1.00 at 12 hours). There was no significant difference between groups when acetylcysteine was started 12–18 hours after ingestion. When acetylcysteine was commenced 18–24 hours postingestion, significantly greater risk of hepatotoxicity was noted in the 20-hour group (RR 1.19, 95% CI 1.00–1.40 at 18 hours; RR 1.61, 95% CI 1.22–2.12 at 24 hours). **Conclusion:** For individuals presenting early after an acute acetaminophen overdose, the risk of hepatotoxicity was lower when the 20-hour intravenous acetylcysteine protocol was initiated. With increasing delay to treatment, the risk was lower when the 72-hour oral acetylcysteine protocol was administered. **Keywords:** acetaminophen toxicity, acetylcysteine, hepatotoxicity

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POOR compliance with a computerized physician order entry process designed to moderate usage of a new diagnostic test: experience within a regional health authority

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Introduction: Heart failure (HF) is a common presentation to the emergency department (ED) and can be a difficult clinical diagnosis. Serum brain natriuretic peptide (BNP) has been purported to improve the accuracy of HF diagnosis in ED patients with dyspnea; however, the inappropriate use of tests can be costly and increase diagnostic uncertainty. This study evaluated the effect of implementing a Web-based form on BNP ordering patterns within a regional health authority. **Methods:** Prior to ordering a BNP, physicians at 5 hospitals were required to complete a simple, intranet-based Web

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form that documented: ordering physician; signs and symptoms of HF; treatment; pretest probability (PTP) of HF; and risk of death within 30 days. Enforcement of form completion was assigned to ward clerks. Site statistics were compared using χ^2 tests and *t* tests with 95% confidence intervals (CI). **Results:** Of 1221 BNP tests ordered over the study period, 338 (27.7%; 95% CI 20.2 to 25.2) forms were completed. Compliance at the 3 community (COM) hospitals (COM1 = 35.7%; COM2 = 84.6%; COM3 = 84.4%) was higher than the 2 university affiliated teaching sites (U1 = 20.8% and U2 = 8.3%). Overall, ED physicians completed the most forms (79.4%) followed by general internists (10.9%) and cardiologists (4.7%); other specialty physicians rarely completed forms (each < 2%). Of completed forms, BNP was ordered in 43 (12.7%) patients whose PTP of HF was ≤ 20% and 64 (18.8%) patients whose PTP was ≥ 80%. In the last quarter, BNP tests increased by 36% at the U sites and decreased by 1.6% at the COM sites. **Conclusion:** Compliance with BNP the BNP Web-based form varied across sites and was low; despite recommendations, misuse was common. Multiple factors appear to influence compliance and appropriateness of test ordering within a hospital and region. Future efforts should examine methods to improve and increase the appropriate use of diagnostic tests. **Keywords:** computerized physician order entry (CPOE), brain natriuretic peptide (BNP), knowledge translation

Winner of the CAEP Medical Student Research Abstract Award

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DO medical learners affect patient length of stay in the pediatric emergency department?

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Introduction: Pediatric emergency departments (PEDs) are staffed by various levels of trainees. With increasing congestion in our PEDs and increasing medical school class sizes, it is important to understand how trainees affect patient flow. We conducted a retrospective study to evaluate how the level of trainee affects various patient flow parameters including patient total length of stay, triage to MD time, and MD to discharge time. **Methods:** We examined all patients triaged to the PED between 6:00 am and 8:00 pm from July 2007 to June 2008. All levels of trainee are present during these hours. An electronic patient database was used to gather the following variables: triage time, MD time (defined as time of first "physician" contact, where "physician" = clerk, resident, or attending physician), discharge time, CTAS score, and level of physician training at first contact (clerk, junior resident, senior resident, or attending). Our primary outcome measure was median total patient length of stay (LOS). Secondary outcome measures included median triage to MD time (TTMD) and median MD time to patient discharge (MDDC). **Results:** 35 819 patients were included in the study. Seventy-four percent of patients were seen by attendings alone, 4% by senior residents, 17% by junior residents, and 5% by clerks. When compared to attendings, the median LOS was slightly shorter for senior residents (180 v. 171 min, $p = 0.000$) and longer for junior residents and clerks (188, 185 min, $p = 0.000$). Median TTMD was significantly longer for attendings (136 min) than for senior residents, junior residents and clerks (97, 117, 100 min, $p = 0.000$). Median MDDC for attendings (44 min) was significantly shorter than for clerks, junior and senior residents (85, 71, 74 min, $p = 0.000$). **Conclusion:** When compared to patients who saw only an attending physician, patients seen by junior trainees are seen sooner by a physician, but have a longer total length of stay. Patients seen by senior trainees are seen sooner by a physician and have a shorter total length of stay. **Keywords:** ED clerkship, residency training, length of stay

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DRIVING under the influence of drugs: a pilot study

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Introduction: Many recreational drugs and prescription medications cause sedation or otherwise impair driving skills and are suspected to cause car crashes. However the evidence linking recreational drug use to car crashes is mixed. In this study we sought to determine the prevalence of marijuana and other psychotropic substance use by injured drivers treated in the ED of a Canadian tertiary care trauma centre. **Methods:** We obtained excess whole blood remaining after clinical use from consecutive drivers treated for injuries sustained in a car crash. Blood was aliquoted into 2 mL vials and frozen at –20°C until analysis. Blood alcohol concentration (BAC) and other clinical and crash data were extracted from the medical record using a structured form. Information on driver's collision history was obtained from the Insurance Corporation of BC (ICBC). After data was anonymized, whole blood samples were analyzed by gas chromatography-mass spectrometry and liquid chromatography–mass spectrometry to identify recreational drugs (cannabinoids, cocaine and metabolites, amphetamines) and psychotropic pharmaceuticals (benzodiazepines, opiates, other hypnotics, and sedating antidepressants). **Results:** We obtained and analyzed blood samples from 55 injured drivers of which 44 could be linked to ICBC records. In this sample 21/55 (36%; 95% CI 26%–51%) had BAC > legal limit, 12/55 (22%; 95% CI 12%–34%) were marijuana users (COOH-THC positive) including 5/55 (9%; 95% CI 3%–19%) with evidence of recent marijuana use (THC positive). Cocaine (4/55) and sedating pharmaceuticals such as benzodiazepines (5/55), opiates (3/55), and diphenhydramine (5/55) were also commonly detected. Most of these drivers (37/44 = 84%) had a previous insurance claim. **Conclusion:** In this pilot study, marijuana and other psychotropic drugs were frequently detected in whole blood samples from injured drivers. Further research is required to determine the role these drugs play in causing car crashes. **Keywords:** impaired drivers, substance abuse, blood alcohol content

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BICYCLE helmet use 4 years after introduction of universal helmet legislation in an urban community

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Introduction: Bicycle helmets reduce fatal and nonfatal injuries, and Alberta passed a law mandating helmet use for cyclists less than 18 years of age in 2002. A community outside Edmonton passed expanded local legislation to target all age groups in 2006. This study evaluated the effect of mandatory helmet legislation on bicycle helmet use in this community. **Methods:** Two identical surveys were conducted in St. Albert 2 years before and 4 years after helmet legislation (2002). Bicyclists were observed in randomly selected sites from June to August. Helmet wearing were recorded by trained observers. Poisson regression analysis was used to obtain helmet prevalence (HP) and prevalence ratio (PR) estimates with 95% confidence intervals (CI). **Results:** HP increased from 63% to 99% in children (PR 1.58; 95% CI 1.38–1.81) and from 10% to 73% in adolescents (PR 7.64; 95% CI 1.53–38.1); however, not significantly in adults (58% to 74%/PR 1.27; 95% CI 0.94–1.70). Male HP increased from 42% to 89% (PR 2.13; 95% CI 1.79–2.53); female HP increased from 51% to 96% (PR 1.87; 95% CI 1.42–2.47). After adjustment for gender, location, companion helmet use and temperature, all age groups demonstrated a statistically significant increase in helmet prevalence from pre- to postlegislation (children PR 1.53; 95% CI 1.34–1.74; adolescents PR 6.51; 95% CI 1.37–30.9; adults PR 1.31;

95% CI 1.01–1.69). Prelegislation, children and adults had similar HP (PR 1.14; 95% CI 0.88–1.47), but children were more likely to wear helmets postlegislation (PR 1.33; 95% CI 1.13–1.57). Adolescent HP was much lower than adults before legislation (PR 0.19; 95% CI 0.04–0.91), but similar to adults after legislation (PR 0.96; 95% CI 0.70–1.32). Females were more likely to wear helmets (PR 1.10; 95% CI 1.01–1.18). HP decreased in warm (> 20ºC) compared with cool (< 10ºC) weather (PR 0.94; 95% CI 0.89–0.99). **Conclusion:** Universal bicycle helmet legislation was associated with a significant increase in helmet use for children, adolescents and adults. **Keywords:** bicycle helmet legislation, bicycle helmet utilization, survey research

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ARE parental assessments of pediatric illness acuity accurate compared to nurse triage assessments?

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Introduction: Triage delays cause patient dissatisfaction and increase the risk of sick children waiting in triage queues. If parents can accurately rate their child's illness acuity, triage workload and delays could be reduced by permitting parental triage of low acuity children using e-registration tools. We assessed agreement between parent- and nurse-perceived acuity, and estimated parental sensitivity for detecting high acuity conditions. Our hypothesis was that parents would accurately identify > 80% of CTAS 1–3 patients and > 90% of CTAS 1–2 patients as high acuity (urgent or life-threatening). **Methods:** Using a cross-sectional mail survey, the Health Quality Council of Alberta surveyed parents of children seen at 4 urban Alberta emergency departments (ED) from Jan. 27 to Feb. 23, 2007. Surveys included an urgency scale (life-threatening, possibly life threatening, urgent, somewhat urgent, not urgent) analogous to CTAS categories 1–5. Parent-assessed acuity was compared to nurse-assigned CTAS categories, and parental accuracy was determined by percent exact agreement, percent agreement within 1 CTAS level, and weighted kappa. **Results:** Parents provided acuity assessments on 1109 children aged 1–12, including 0.4%, 12.1%, 50.8%, 35.1% and 1.7% in CTAS levels 1–5 respectively. Exact nurse–parent agreement occurred in 38.7% of cases (25%, 36%, 26%, 59% and 10% in CTAS levels 1–5). Agreement within 1 triage level occurred in 90% of cases (75%, 69%, 94%, 91% and 68% respectively) with a weighted Kappa of 0.15. Parents correctly identified CTAS 1–2 patients as high acuity in 72.4% of cases (sensitivity = 72.4%), but 41 CTAS 2 patients (30.6%) and 302 CTAS 3 patients (53.6%) were down-triaged into nonurgent categories. **Conclusion:** Nurse–parent agreement on pediatric illness acuity is poor. Parents consider many emergent and urgent children to be in nonurgent categories. Parent-based acuity assessment may not be safe or reliable. **Keywords:** parental assessment, CTAS, pediatrics

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HOW accurate are emergency physicians in predicting the development of an adverse cardiac event within 30 days of the emergency department visit?

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Introduction: Physicians often base management decisions in patients with nontraumatic chest pain on an unstructured assessment of the pretest probability of disease. We determine physicians' accuracy to predict the development of an adverse cardiac event within 30 days of the emergency department (ED) visit. **Methods:** We conducted a prospective cohort study in a tertiary care ED over a 6-month period. Patients at least 25 years of age with a primary complaint of chest pain were eligible for enrollment. Exclusion criteria were: acute ST-segment elevation, hemodynamic instability (SBP < 90 mm Hg, HR < 50 or > 100 bpm), terminal noncardiac illness, pregnancy, or cocaine use. Prior to cardiac biomarker and stress testing, we asked certified emergency physicians and emergency medicine residents to assess (1) whether the pain was cardiac in etiology and (2) the pretest probability of acute coronary syndrome on an ordinal scale (0%–100%). The primary outcome was acute myocardial infarction, revascularization, death, or a new perfusion defect on radionuclide imaging within 30 days. Analyses included descriptive statistics and 2×2 contingency table analysis. **Results:** We enrolled 539 patients. Patient characteristics were: mean age 59.3 years, 58.8% male, 18.7% diabetes, 20.4% acute myocardial infarction and 18.7% admitted. 15.8% (95% CI 12.9%–19.2%) experienced an adverse cardiac event within 30 days. Diagnostic accuracy of physician assessment of pain etiology was: sensitivity 77% (95% CI 66%–85%), specificity 63% (95% CI 58%–67%), positive LR 2.0 (95% CI 1.7–2.4), negative LR 0.4 (95% CI 0.3–0.6). Twenty-one (3.9%) patients with a pretest probability < 10% experienced an adverse cardiac event within 30 days. **Conclusion:** Unstructured physician accuracy in predicting the development of an adverse cardiac event within 30 days is limited. Clinical decision rules are needed to optimize the management of patients with nontraumatic chest pain. **Keywords:** risk prediction, acute coronary syndromes, physician assessed risk

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NATIONAL survey of neurologists regarding the need and sensitivity for a clinical decision rule to predict high risk TIA patients

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Introduction: Up to 5% of ED patients with transient ischemic attack (TIA) suffer a stroke or die within 1 week of their diagnosis. This national study examined neurologists' current practice for TIA, the need for a clinical decision rule (CDR) and the required sensitivity of such a rule. **Methods:** We surveyed 655 Canadian neurologists registered in a national physician directory by using a modified Dillman technique with a prenotification letter and up to 4 survey attempts employing letter mail. Neurologists were asked 33 questions about their demographics, current management of adult patients with TIA, if a CDR for TIA is required to identify patients at high risk of stroke or death ≤ 7 days, and the ideal sensitivity of this rule. Analysis included descriptive statistics. **Results:** We had a total response rate of 50.1% (334/655). Respondents were male 78.4%, mean age 49.8 years, and 79.0% practice in a university or community teaching hospital. Of respondents, 91.7% thought all TIA patients should be investigated with CT, and 93.9% thought TIA patients should have an EKG. 26.7% use some existing clinical tool to stratify patients as high risk. Of those using a tool, 31% use the ABCD2 rule, and 15% use the original ABCD rule. 54% of all respondents state that their patients are seen in a stroke clinic within 1 week of initial diagnosis. 94.9% report they would use a highly sensitive CDR for patients with TIA to determine if they are at high risk of impending stroke. The median required sensitivity of a rule was 94% (IQR 90–95). **Conclusion:** Neurologists state that they would use a highly sensitive CDR to determine which patients are at high risk of stroke or impending death within 7 days of initial TIA. Their median ideal sensitivity, 94%, was much higher than that of the most commonly used tool, the ABCD2 rule, which has a sensitivity of only 83% for stroke or death ≤ 7 days. These results indicate a CDR to predict high risk TIA needs to be more sensitive than those currently available. **Keywords:** transient ischemic attack, clinical prediction rule, survey research

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THE EFFECT of helmet use on facial injuries in pediatric skiers and snowboarders: a case control study

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Introduction: Approximately 1.5 million Canadians ski or snowboard with an injury rate of 2.5–9.1 injuries per 1000 skier days. While helmet use has been demonstrated to decrease the risk of head injury, the effect of helmet use on facial injuries is unclear. **Methods:** Data were collected from the Quebec Ministry of Education, Leisure, and Sport from 1994 to 2005. Cases, defined as children with a ski or snowboard related facial injury, were compared to control children with leg, arm, or trunk injuries. Facial injuries were stratified according to anatomic location of injury. Helmet use, demographic data, environmental factors, and crash circumstances were examined. Unadjusted and adjusted odds ratios (OR) and 95% confidence intervals were calculated. **Results:** Of the 72 309 subjects, there were 7488 cases with one or more facial injury and 64 821 controls. Of the 8741 documented facial injuries, 36% did not have a specified anatomic location, 14% were upper face, 26% were mid face, and 24% were lower face. Cases were more likely to be skiers, younger, male, more advanced riders, and own their equipment. Controls were more likely to have a noncollision mechanism of injury. We observed a statistically significant protective effect of helmets for upper facial injury and facial injury with unspecified anatomic location (adjusted OR 0.71 [95% CI 0.56–0.92] and 0.88 [95% CI 0.79–0.97]). Adjustments were made for age, sex, ability, experience, instruction, ownership of equipment, type of participation, mechanism, location, and environmental conditions at the time of injury. **Conclusion:** These results suggest that wearing a helmet while skiing or snowboarding may reduce the risk of upper face injury by 29%. Further exploration of effect modification by age, sex, and activity may result in a greater understanding of the protective effect of helmets on facial injury. **Keywords:** ski helmets, skiers and snowboarders, facial injuries

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ANAPHYLAXIS, allergic reactions, and biphasic reactions in the ED: a retrospective chart review

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Introduction: Limited scientific evidence exists in supporting current guidelines for the management of anaphylaxis and allergic reactions in the emergency department (ED). We sought to evaluate the incidence of biphasic immune reactions among adult patients presenting with acute allergic reactions, and review practice variations among ED physicians. **Methods:** We reviewed health records from a tertiary care academic centre (120 000 visits/year). We included all nonpregnant ED adult (≥ 18 yr) visits with an ICD-10 diagnosis related to anaphylaxis and allergic reactions. Severity of disease was not reliably documented in a pilot chart review. A single reviewer extracted nonsubjective data using a piloted standardized data collection form. We performed double data entry in 10% of charts randomly selected. We present descriptive statistics with 95% CI. **Results:** 45 patients met our inclusion criteria between Oct. 2006 and Oct. 2007, with the following characteristics: mean age 45; females 71.1%; and admission to hospital 20.0%. Mean time intervals from ED registration were: 1) to MD assessment 57.8 min (95% CI 34.8–80.8); 2) to initiation of therapy 80.1 min (95% CI 53.6–106.6); 3) to admission to hospital 280.8 min (95% CI 117.9–443.7); and 4) to ED discharge 350.2 min (95% CI 289.6–410.9). Patients received the following drugs: diphenhydramine 75.6%, steroids 60.0%, epinephrine 46.7%, ranitidine 46.7%, ventolin 31.1%, and IV fluids 22.2%. Of the 36 patients discharged home, 33.3% were prescribed an EpiPen, and 30.6% oral steroids (median duration 3 d, range 1–7). Biphasic immune reaction was described in only 1 patient returning to the ED more than 24 h after the initial reaction. **Conclusion:** We observed significant practice variation among emergency physicians treating patients with anaphylaxis and allergic reactions. We need a large prospective trial in order to identify factors associated with rare biphasic reactions, and to better guide appropriate posttreatment management in the ED. **Keywords:** allergic reactions, biphasic allergic reactions, health records review

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RESIDENT acceptance and attitudes to a simulation based disaster medicine curriculum

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Introduction: A disaster medicine curriculum that is brief, effective, and enjoyable for the participants may be a valuable addition to emergency Medicine residency training. This study examined the attitudes of emergency medicine residents towards a simulation based disaster medicine curriculum. **Methods:** Emergency medicine residents participated in a simulation based disaster medicine curriculum consisting of five 1-hour sessions. Each session focused on one aspect of disaster planning. During the curriculum the residents developed on a hospital disaster plan for a simulated hospital. A 3-hour disaster simulation was conducted using a Web-based disaster simulator (disastermed.ca) in which the residents played various roles in a hospital emergency department. The interfaced with the simulation on personal computers linked through a local network. The simulation was configured to reflect a busy hospital that responded to the external events and the simulated actions made by the residents. Prior to and after the curriculum, residents were asked on a Likert scale about their confidence on disaster preparedness. The response was compared using a paired t test. After the simulation, the residents evaluated the curriculum and simulation. **Results:** Seventeen emergency medicine residents in both Royal College and Family Medicine programs completed the simulation. The curriculum increased resident confidence in being prepared for a disaster (mean = 2.0/10 pre to 6.0/10 post, $p < 0.01$). All (100%) of the residents preferred a simulation to a lecture-based curriculum. The residents rated the quality of the curriculum as 7.8/10 (range 6–9).**Conclusion:** A simulation based model of disaster medicine training, requiring 8 hours of classroom time, was judged by medical residents to be valuable and increased their confidence in disaster management. **Keywords:** disaster medicine training, resident education, simulation

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SATISFACTION with emergency department care among family members of critically ill patients: a feasibility study

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Introduction: Limited data exists on whether the emergency department (ED) fulfills the needs of families of critically ill patients. The objectives of this survey were to evaluate: 1) survey feasibility; 2) families' needs; and 3) whether the ED met these needs. **Methods:** A survey was administered to a convenience sample of family members of critically ill patients. The survey used a previously validated instrument evaluating 39 individual needs items based on a 4-point Likert scale (score 1–4). Respondents ranked both the individual item's importance and the degree to which it was met while the patient was in the ED. **Results:** Of 33 surveys administered, 20 were completed (response 61%). Mean (SD) age of respondents was 45 (13) years. Respondents were mostly children (40%) and spouses (35%) of patients. Median (IQR) Canadian Triage Assessment Scale score was 2

(2–3), time from triage to nurse attendance was 16 (5–39) minutes, and to physician attendance was 16 (2–82) minutes. Duration of patient stay in the ED was 12 (6–20) hours. Overall, families' needs appeared well met (mean [SD] Likert score 3.3 [0.8]). Respondents ranked the following needs items as most important: honesty; communication of clinical status, prognosis and management plan; and assurance of the quality of care. Performance scores on whether the ED fulfilled these items, however, were lower. Needs most frequently not fulfilled included: to talk to a doctor; to be told about transfer plans; and to be allowed to be with the patient at any time. **Conclusion:** In this pilot survey, the ED appeared to reasonably meet the needs of families of critically ill patients. However, better communication of patients' status and of management plans could better serve families' needs. Additional study is needed to examine the impact of demographic and environmental variables on families' perceived fulfillment of needs. **Keywords:** critically ill patients, family members, satisfaction survey

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A PROSPECTIVE study of ultrasound guided hematoma blocks in distal radius fractures

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Introduction: The hematoma block is a safe and well-recognized method for providing analgesia during reduction of distal forearm and hand fractures. However, obese body habitus, soft-tissue swelling and minimal fracture angulation can make the procedure technically difficult. This study assessed the feasibility of using ultrasound to guide the delivery of hematoma blocks for distal radius fracture reductions. **Methods:** This prospective, observational pilot study enrolled a convenience sample of 10 consecutive patients with distal radius fractures. After informed consent, a high-frequency (5–10 Hz) linear ultrasound (US) transducer was applied in a sagittal fashion along the long axis of the distal radius over the fracture site and 10 mL of 1% lidocaine was injected into the fracture hematoma under US guidance. All procedures were performed by a single operator. A visual analog scale (VAS) was used to assess fracture pain pre and post injection, and pain associated with injection and with fracture reduction. Ultrasound images were obtained and qualitative observations about the technique were recorded. The primary outcome measure was mean VAS change post versus pre injection. **Results:** Successful analgesia was achieved in all patients as assessed by the VAS with a mean decrease in VAS of 48.2 mm (range 29–80; 95% CI 18.4–78.0). The average number of attempts at hematoma block was 1.1. The range of fracture angulation in which hematoma block was attempted was between 4 and 50 degrees. Ultrasound confirmed needle placement within the fracture hematoma in all cases. Qualitatively, we noticed that this technique negated the necessity to palpate the painful fracture, facilitated the infiltration of minimally displaced fractures and reduced the number of attempts at hematoma block. **Conclusion:** Ultrasound guidance facilitates the placement of distal radius hematoma blocks. Supported by a CAEP research grant. **Keywords:** emergency ultrasound, hematoma block, Colle's fracture

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EMERGENCY resident perceptions regarding competence, adverse events and reporting to supervisors: a nationwide survey

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Introduction: Residents may feel reluctant to report to supervisors not feeling competent to perform procedures or undertake clinical duties independently. This may impact patient safety. **Objective:** To characterize residents' perceptions regarding personal competence, and attitudes, practices and perceived barriers to reporting such perceptions to seniors. **Methods:** All Canadian EM residency directors (PDs) (outside Quebec) were solicited to recruit their trainees for a Web-based survey. Participating PDs forwarded residents a survey link and 2 weekly reminders. **Results:** Most PDs (9/10 RCPSC(EM) and 12/13 CFPC(EM)) participated, and 82/220 (37.3%) residents recruited completed all or part of the survey. One-third of residents (30.5%), (n = 25, [19.9%, 41.1%]) agreed with "I sometimes feel unsafe or unqualified with undertaking unsupervised responsibilities or procedures, but I do not report this to my senior physician," and 39.5% (n = 32, [28.2%, 50.8 5]) had felt this way in the past 6 months. 41.5% (n = 34, [30.2%, 52.7%]) of trainees would report feeling not competent half the time or less. Overnight on-call care (38%) (n = 30, [26.6%, 49.3%]), admission decisions (16.5%) and central line insertion (16.5%) were undertaken despite not feeling competent. The most frequent reasons for not reporting were worries about loss of trust, autonomy or respect (47.5%) (n = 38, [35.9%, 59.1%]) or reputation (40.0%) (n = 32, [28.6%, 51.4%]). Suggested changes to improve reporting included encouragement to report without penalty (50.0%), (n = 41, [38.6%, 61.4%]) and a less judgmental environment (n = 39.0%) (n = 32, [27.9%, 50.2%]). Lack of experience and feeling rushed or too busy were cited as the major contributing factors to adverse events for which residents felt some responsibility. **Conclusion:** Residents frequently feel unsafe or unqualified when undertaking unsupervised responsibilities. Barriers to reporting relate largely to social pressures and authority gradients. Modification of the training culture might improve patient safety. **Keywords:** residency training, clinical supervision, adverse events reporting

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USE of a novel Web-based and simulation education course to teach multiple EM procedural ultrasonography skills effectively maintains proficiency over time

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Introduction: Evidence is limited for long-term effectiveness of combined Web-based and simulation teaching for procedural ultrasonography (US) skills. We evaluated a novel procedural US course for emergency medicine (EM). **Methods:** Emergency physicians took part in a procedural US course at a National EM conference. Participants were asked to review the Web-based material prior to attending the 2-hour simulation procedural US course that included central venous catheterization (CVC), foreign body (FB), joint effusion (JE), and thoracentesis (Th). Using a modified Dillman technique, we sent a Web-based survey to participants 6 months later. The survey was pilot tested and reviewed for validity and reliability by 4 academic emergency physicians. The questions were designed to assess participants' perceptions of technical proficiency and course satisfaction. Data was analyzed using descriptive statistics, paired t tests and ANOVA. **Results:** The survey response rate was 61.1% (22/36). Respondents included residents 13.6% and staff 86.4%. Participants' ED practice volumes consisted of: teaching hospitals (50%), high (18.1%), medium (27.3%) and low (4.6%). Participants' prior US training varied: none (4.6%), introductory (54.6%), credentialed (31.8%), and advanced (9.1%). Respondents' perceptions of confidence with technical proficiency improved significantly compared with prior to the course, immediately after and 6 months later, respectively; CVC (38.1%, 81.0%, 76.2%): FB (5.3%, 66.7%, 52.4%); JE (14.3%, 47.6%, 38.1%); Th (9.5%, 38.1%, 38.1%) ($p < 0.05$). 80.0% of respondents continued to be very satisfied or somewhat satisfied with the course. Combined Web-based and simulation teaching was felt to be more effective than simulation teaching alone by 66.7%. **Conclusion:** Perceptions of confidence in technical proficiency are sustained 6 months after taking the procedural US course. Web-based teaching combined

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with a short simulation session was effective in helping learners develop US procedural skills quickly into their EM practice. **Keywords:** medical education, simulation, Web-based education

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CONDUCTED electrical weapon use on a methamphetamine intoxicated animal model

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Introduction: Conducted electrical weapons (CEW) are used to control agitated subjects. These subjects may have methamphetamine intoxication (MI) present. Death has occurred in this population on occasion. We examined the cardiac and metabolic effects of CEW exposure in the presence of MI using an animal model. **Methods:** 16 Dorset sheep (26–78 kg) had cardiac rhythm and arterial blood sampling at baseline and after each intervention. The sheep received 0.0, 0.5, 1.0 or 1.5 mg/kg of IV methamphetamine (4 animals in each group). All animals received CEW exposures in sequence: 5; 15; 30; and 40 seconds. There was a 3-minute rest between applications. Cardiac motion was monitored by thoracotomy visualization or echocardiography. Darts were inserted to depth at the sternal notch and the cardiac apex. Blood samples were analyzed for acidosis after MI and after each CEW exposure. **Results:** All animals demonstrated signs of MI including atrial and ventricular ectopy before exposure. Small animals (n = 8, < 38.5 kg) had supraventricular dysrythmias and large animals (n = 8, > 68 kg) had sinus tachycardia after exposures. One of the smaller animals had ventricular ectopy including a run of ventricular tachycardia after exposure that spontaneously resolved. Five animals of varying size (26–74 kg) had reliable cardiac capture during exposure but no ventricular fibrillation (3 control animals, 2 animals with 1.5 mg/kg MI). There was immediate reversion to sinus tachycardia when the application was stopped. No significant differences in pH or lactate were noted. **Conclusion:** MI in animals of lower body weight yielded supraventricular dysrhythmias after CEW exposure. After the initial 30 minutes of MI, larger animals had sinus tachycardia that generally increased after CEW exposure (but intraexposure slowing of heart rate). There was variable cardiac capture that was not associated with MI and no induction of ventricular fibrillation. **Keywords:** conducted energy weapon, methamphetamine intoxication, animal model research

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CAN early acetaminophen concentrations be used to exclude patients from the need for N-acetylcysteine therapy?

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Introduction: We sought to determine whether an acetaminophen concentration obtained before 4 hours postingestion can reliably predict which patients will have a potentially nontoxic acetaminophen concentration 4–24 hours postingestion. In a previous American cohort, a cutoff of 662 µmol/L between 2 and 4 hours postingestion had a negative predictive value of 98%–99% for identifying patients who had a potentially nontoxic acetaminophen concentration from 4 to 24 hours postingestion. Our purpose was to determine if this cutoff has predictive value in a large cohort of Canadian patients. **Methods:** Data from patients who had an acute acetaminophen ingestion and an acetaminophen concentration obtained before 4 hours postingestion were extracted from a database of patients with acetaminophen poisoning seen at one of 34 Canadian hospitals from 1980 to 2005. We studied the threshold concentration of 662 µmol/L between 2 and 4 hours postingestion. The sensitivity, specificity, positive and negative predictive values of having this or greater concentration in predicting which patients would have a potentially toxic acetaminophen concentration from 4 to 24 hours postingestion were calculated. **Results:** An acetaminophen concentration of 662 µmol/L or higher from 2 to 4 hours postingestion had a sensitivity of 0.92 (95% confidence interval [CI] 0.89–0.94), a specificity of 0.71 (95% CI 0.68–0.74), a negative predictive value of 0.95 (95% CI 0.93–0.96) and a positive predictive value of 0.61 (95% CI 0.57–0.65) for identifying patients who had a potentially toxic acetaminophen concentration from 4 to 24 hours postingestion. **Conclusion:** A cutoff acetaminophen concentration of 662 µmol/L from 2 to 4 hours after acute acetaminophen ingestion may be predictive of a potentially nontoxic acetaminophen concentration from 4 to 24 hours postingestion. Further study is required to determine if a different cutoff concentration would have a higher, more acceptable sensitivity. This threshold would require prospective validation before clinical use. **Keywords:** acetaminophen levels, acetaminophen poisoning, n-acetylcysteine

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OUTCOMES following COPD presentations to emergency departments in Alberta, Canada

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Introduction: Patients with COPD have a complex, multisystem disease which frequently presents in exacerbation to the emergency department (ED). Once discharged, their disease requires treatment changes and guidelines recommend urgent follow-up after ED visits. The objective of this study was to describe the outcomes of COPD presentations to EDs made by adults in the province of Alberta, Canada. **Methods:** The Ambulatory Care Classification System of Alberta and provincial administrative databases were used to obtain all ED encounters for COPD during 6 fiscal years (04/99–03/05). Information extracted included demographics, ED visit timing, outcomes; all data were coded by trained medical records nosologists. Follow-up for a cohort occurred for 365 days; data analysis included descriptive summaries and survival curves for MD follow-up, ED visits, and deaths. **Results:** There were 85 330 ED visits for acute COPD of which 67% were discharged from the ED. Median ED length of stay (LOS) was higher in large urban centres (Calgary: 5 h 9 min); Edmonton: 4 h 58 min) than other health regions (1 h 17 min). Of the 33% of ED visits that were not discharged, most (32%) were admitted; however, a small proportion was admitted to the ICU (1%) or died (0.1%). Median ED LOS for admitted patients was also highest in Calgary (7 h 32 min) and Edmonton (8 h 43 min) EDs. Following discharge, the median time to first follow-up was 13 days; however, only 45% had follow-up visits in the first 7 days. Repeat ED visits within 7 days occurred in 5.7% of discharged patients; repeat ED visits within 365 days of discharge occurred in 25.6% of discharged patients. Follow-up did appear to vary based on SES indicators. **Conclusion:** COPD ED visits more frequently result in admission and death than other respiratory disease; regional variation is impressive. Moreover, discharged patients have delayed follow-up and often require repeat ED visits. Interventions to improve reassessment designed to reduce COPD-related relapses should be explored. **Keywords:** COPD, COPD-related relapses, administrative database research

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WHY are some ED patients with acute atrial fibrillation not treated with the Ottawa Aggressive Protocol for Rapid Rhythm Control?

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Introduction: We previously described the safety and efficacy of the

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Ottawa Aggressive Protocol (OAP) for rapid ED rhythm control of patients presenting with acute-onset atrial fibrillation (AAF) or flutter (AAFL). Our study aimed to explore how often and why cardioversion may not be attempted on patients with AAF or AAFL. **Methods:** We conducted an ED health records review of consecutive adult visits for AAF or AAFL at 2 teaching hospital EDs during an 18-month period in 2005/06. Patients were identified from the National Ambulatory Care Reporting System database and included if their new-onset AAF or AAFL was not known to be chronic and if they were not treated with rhythm control drugs or electrical cardioversion. We evaluated disposition status and the reason for not treating according to the OAP. We calculated descriptive statistics with 95% CIs. **Results:** We identified 427 cases (52.0%) not treated with pharmacologic or electrical cardioversion from amongst the 821 AAF/AAFL visits reviewed. Characteristics of these patients were: mean age 72.7 years (range 28–96), female 53.9%, median duration of arrhythmia 5 hours (range 0–500), mean heart rate 121.6, associated CHF 15.9%, and ACS 3.5%. 52.9% received IV rate control drugs. Compared to those treated with cardioversion during the same period, the study patients had rates of hospital admission of 27.4% (v. 6.5%) and discharge in sinus rhythm of 27.7% (v. 91.4%). Reasons that the OAP was not used were: duration of arrhythmia not known 51.8%, spontaneous conversion 26.7%, duration > 48 hours and not anticoagulated 13.8%, frequent recurrence AAF 4.0%, refused consent 2.8%, patient unstable 2.8%, thromboembolic risk 1.2%, and no documented reason 5.1%. **Conclusion:** Half of AAF and AAFL cases seen in the ED were not treated with attempted cardioversion and the vast majority of these were not appropriate for the OAP protocol. The most common reasons were arrhythmia duration > 48 hours or unknown and spontaneous conversion to sinus rhythm. **Keywords:** acute atrial fibrillation, Ottawa Aggressive Protocol, cardioversion

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ARE return visits useful in flagging diagnosis errors in patients discharged from the emergency department?

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Introduction: Diagnosis errors (DxE) have been shown to be the most frequent type of errors in the emergency department (ED) which were identified mainly from health care providers. The objective of this study is to explore the efficacy of return visits in flagging DxE among patients discharged from the ED. **Methods:** This descriptive study is part of a larger research project examining medical errors reported by physicians, nurses, and pharmacists conducted in one university teaching ED with annual census of 65 000 visits (March 2006–June 2008). All incidents were reviewed by a research committee to determine the presence of an actual error. Among all the DxE (n = 173), 69 DxE involved discharged patients. ED administrative databases were used to verify whether a subsequent related and unplanned return visit occurred within 60 days after ED departure. Chief complaint (CC) was used to determine if the return visit was planned (e.g., return for tests) and related to the initial visit (e.g., similar CC at both visits). **Results:** Patients who incurred a DxE (n = 69) were aged between 19 to 94 years old (mean = 60.4; SD 22.2), 29% arrived by ambulance, 75% had an urgent triage score (Level I = Resuscitation to Level III-Urgent) and a mean ED length of stay of 12.7 hours (SD 13.5). DxE were more frequent in patients with CC of orthopaedic nature (23%), followed by neurology (17%), cardiology (13%) and gastroenterology (12%). These 69 diagnosis errors were mainly identify at the initial visit by ED physicians (n = 64). However, 2 were only detected at their return visit by admitting physicians and 1 was identified by an abnormal lab result. Administrative databases revealed that 40 (58%) had an unplanned and related visit. Ninety-five percent (n = 38) of the returns occurred within 14 days after the initial visit (42.5% within 3 days, 30% between 3 to 7 days and 22.5% between 7 to 14 days). **Conclusion:** Unplanned related return visits using administrative databases can identify almost 60% of DxE amongst patients discharged from the ED. **Keywords:** unplanned ED revisits, diagnostic errors, administrative databases

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EVACUATION of human patient simulators during Project MoVES interfacility disaster exercises

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Introduction: We evaluated patient outcomes of human simulators in response to movement during evacuation and surge. **Methods:** We conducted a study of the evacuation and surge of wireless patient simulators during 3 consecutive disaster drills among 6 hospital facilities. There were 6 patient simulators (4 adult, 2 pediatric) and 22 paper patients scripted from actual patient records. For each drill, simulators were introduced to unit staff (critical care unit and/or emergency department) who were unaware of their facility's evacuation or surge assignment until the exercise commenced. Affected units were required to evacuate to a staging location on the same level (horizontal evacuation) or to another level (vertical evacuation). Two simulators required ongoing management during EMS transport to the surge facility. The remaining 4 simulators were packaged, transported, and introduced with the surge of paper patients at the receiving facility. Simulator logs, accelerometer data, video recordings, and participant and evaluator observations were abstracted to a central database. **Results:** Combined data from the 3 drill dates led to 18 sets of simulator observations. Staff readily adapted to the simulators and managed these patients while within their units. Vertical evacuation was completed for 10 simulators and 14 were successfully evacuated from the facility. Simulator status remained stable throughout evacuation and surge for 9 patients, 7 patients had a decline in status and 2 died. Mean clinical errors per simulator were 1.8 (range 0–4): one simulator was dropped, and 2 simulators died. For one arrest, caregivers failed to ventilate the intubated simulator during evacuation. The other arrest was inevitable secondary to patient age and acute critical condition. **Conclusion:** Human simulator technology offered hospital personnel direct hands-on experience in the evacuation of critically ill patients. Evacuation of patient simulators can identify clinical care issues that may assist in hospital disaster planning. **Keywords:** patient simulators, evacuation, disaster exercises

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PEDIATRIC emergency early returns: Why do they come back?

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Introduction: Canadian emergency departments (ED) system are burdened by overutilization and overcrowding. In pediatrics, the issue of overcrowding has been described as a "national crisis for children." Early return patients (ERPs) account for up to 14% of all emergency visits per year. Pediatric ERPs can burden an overtaxed system, and risk exposure to infectious diseases while in the ED. Our objective was to identify reasons why parents make early return visits within 72 hours of discharge from a Canadian pediatric emergency department (PED) and to investigate associated demographic and diagnostic variables. **Methods:** Survey and chart review methods were used from September 2005 to September 2006. A convenience sample of the parents of pediatric patients returning to the PED within 72 hours of discharge was employed. A chart review was completed on consented survey

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participants. **Results:** A total of 264 parents were approached to participate. There was an 87.5% response rate and 212 charts were reviewed (81%). The overall rate of early return was 5.4%. Parents most frequently stated (59%) that they returned because of their child's condition worsened, and many parents (66.7%) reported feeling stressed. Patients were typically under 6 years of age (67.4%), and most frequently diagnosed with infectious diseases (38%). Patients triaged on the Canadian Emergency Department Triage and Acuity Scale as CTAS 2 on initial visits were more likely to be admitted on return regardless of age ($p < 0.001$). **Conclusion:** Factors associated with returns in our sample included age, diagnosis, and parental stress. Further defining variables associated with early return visits could help develop a tool to identify pediatric patients at increased risk for early return. This could help direct interventions and resources to address needs in this group and pre-empt the need to return. **Keywords:** emergency department revisits, health records review, pediatrics

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QUALIFIED first aid and rescue as performed by ski patrol

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Introduction: Previous studies on injury assessment by ski patrol (SP) have indicated underestimation of multiple injuries. We sought to assess the accuracy of on-scene assessment, treatment, and transportation decisions by the SP at Whistler/Blackcomb (WB) ski areas. **Methods:** We conducted a health records review of a random sample of adult skiers and snowboarders treated on WB by SP as well as by physicians at the Whistler Medical Clinic (WMC) during 2005/06. We abstracted data from Ski Area Accident Report Forms (SAARs) filed by the SP and the WMC charts. For the primary outcome, we compared injury assessment on WB by SP to final injuries found at WMC. For the second objective, treatment and transportation decisions, we compared SP first aid care, transportation decisions, and time of transport for the various injuries as found in the WMC chart. **Results:** Of 243 WB SAARs reviewed, 196 corresponding WMC charts (80.6%) were found. Patients had these characteristics: male 59.3%, mean age 33.9 years, intermediate skier 33.7%, first day 39.2%, weather clear 44.2%, on a "more difficult" run 42.7%, accident caused by loss of control (53.8%), transported to base by toboggan 58.2%, mean injury severity score (ISS), 3.4 (range 0–13), a median transport time to WMC 79 minutes. SP diagnostic accuracy was "correct diagnosis" 90.3%, "mainly correct" (failure to recognize injuries that would not command urgent intervention) 9.7%, and "incorrect" (serious diagnosis missed) 0.0%. The more seriously injured patients (by ISS score and need for urgent transport to hospital) had a median transport time to WMC of 96 minutes. Appropriate transport decisions were made in 99.0% of the cases, with no adverse events occurring as a result of the transport decision. **Conclusion:** Assessment, treatment, and transport decisions made by the WB SP were accurate and appropriate with no associated adverse events as a result of the care delivered. We determined that excellent care was delivered by members of the SP at WB. **Keywords:** first aid and rescue, ski patrol, health records review

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BOUNCE backs in a rural emergency department

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Introduction: The rate of return visits of urban emergency departments (ED) has been well studied and reported as approximately 3% within 72 hours. However, the current literature does not report the rate of return visits for rural ED. This purpose of this study was to determine the bounce back rate of a rural ED and characterize the visits. **Methods:** A retrospective chart review was performed on all visits to the South Huron Hospital ED between April 1, 2007 and March 31, 2008. Charts were reviewed for patient age, Canadian Triage and Acuity Scale (CTAS) score, most common diagnoses and discharge disposition for each visit. **Results:** Of the 9935 ED visits during this 12-month period, 450 (4.5%) were return visits within 7 days. Patient age ranged from 3 months to 93 years with a median age of 45 years and 54% male. The most common CTAS score of return visits to the ED was 4 (45.8%), followed by 5 (21.1%), 3 (32.0%) and 2 (1.1%). The most common diagnosis was acute upper respiratory tract infection (4.4%), unspecified abdominal pain (3.8%) and noninfectious gastroenteritis and colitis (2.9%). The majority of patients (86.4%) were treated in the ED and discharged home. 7.1% were admitted and 3.8% were transferred to another facility. **Conclusion:** This study demonstrates that the bounce back rate of a rural ED is similar to that of urban ED. The majority of return visits are low acuity and acute respiratory tract infection represents the most common return diagnoses. **Keywords:** rural medicine, ED revisits, health records review

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COMMUNITY assessment and treatment of opioid overdose

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Introduction: Community based naloxone programs have been in operation for many years; however, there is limited data about the safety and efficacy of such programs. The objectives of this study were to gather preliminary results on the safety and use of naloxone in the community setting. **Methods:** This was a prospective, observational study that took place in an urban Canadian centre over a 20-month period (11/05–07/07). A convenience sample of clients accessing a local needle exchange program were approached to participate in the study. After informed consent, all subjects were trained in overdose recognition, artificial respiration (AR), naloxone administration and emergency medical services (EMS) activation. Descriptive results include participant demographics, use of naloxone in the community, rates of EMS activation and adverse events. **Results:** A total of 50 clients participated. Most participants (62%) were male and the average age was 44.1 years. The majority (84%) were current opiate users; 80% had previously overdosed themselves and 92% had been present when someone else had overdosed. Naloxone use was reported 9 times by participants. It was administered to another individual in 90% of cases; one person self-administered naloxone. It was most often administered in a private residence (56%) and in all cases an opioid was involved in the overdose. AR was given in 4 cases and a pocket mask was used in 2 of these. A clean needle and syringe were used in all cases; however, EMS were activated in only one case. No adverse reactions were reported. Only 15 (30%) clients were available for follow up at the conclusion of the study period; of these 11 reported that their own drug use had decreased since being trained in naloxone. **Conclusion:** Community based naloxone programs appear to be safe and have the potential to reduce the morbidity and mortality associated with opioid overdose in the community; however, significant barriers still exist to EMS activation. **Keywords:** community based naloxone programs, opioid dependence, needle exchange

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SAFE transport of patients with acute coronary syndrome or cardiogenic shock by skilled air medical crews

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Introduction: Acute coronary syndrome (ACS) is a spectrum of

disease that includes unstable angina, non-ST elevation myocardial infarction, and ST elevation myocardial infarction. Cardiogenic shock is sometimes a severe complication of ACS. Patients may require interfacility transfer for emergent intervention. Transfer requires appropriate transport personnel, but little is published regarding the level of care ACS patients require en route to ensure patient safety. The objective of this study was to examine ACS patient transfers to determine the incidence of adverse events (AE) by level of paramedic certification (primary, advanced, or critical care) in a large air medical transport service. **Methods:** This was a retrospective, descriptive review of prospectively collected data for air medical transfer of all ACS or cardiogenic shock patients in Ontario, Canada from January 2005 to June 2007. Call records and patient care reports were screened for AE identifiers, including resuscitation medication, procedure and unstable cardiac rhythms. Each chart identified as having an AE was independently reviewed by 2 trained abstractors, with consensus in cases of disagreement, to determine the incidence and type of AE. Interrater agreement was calculated using Cohen's kappa. **Results:** There were 2258 patient transfers with a primary diagnosis of ACS or cardiogenic shock during the study period. The mean age was 62 years (range 24–91), and 68% of patients were male. AEs were identified in 127 (5.6%) transfers, with hypotension, increasing chest pain and arrhythmia being the 3 most common. Interrater agreement yielded a kappa of 0.962. Adverse rates for primary, advanced, and critical care transport teams were 1.9%, 3%, and 7.7%, respectively. There was 1 death in flight. Management of the AEs were within the scope of practice of transport personnel in all but 1 case. **Conclusion:** The incidence of AEs in air medical transport of ACS patients was low. Air medical crews can safely transport this potentially unstable patient population. **Keywords:** airmedical transport, patient safety, adverse events

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PAIN management in the emergency department and its relationship to patient satisfaction

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Purpose: The purpose of this study is to measure the correlation of pain reduction toe level of patient satisfaction in patients who present to the ED with pain as their chief complaint. **Methodology:** This is an observational study of patients who present to the ED with pain of 4 or more as their chief complaint to a level one adult and pediatric trauma centre. For the measurement of pain prior to and after treatment the Brief Pain Inventory (BPI) and the Visual Analogue Score (VAS) was administered by research fellows to the patients in the treatment rooms. For the measurement of patient satisfaction, the Medical Interview Satisfaction Scale (MISS) was administered prior to patients being admitted or released from the ED. **Results:** At total of 159 patients enrolled in the study with 60% having a reduction in pain levels of 40% or more and 39% not having a reduction in pain. The majority 82% reported having pain on a scale of 6 or more when they presented to the ED for treatment and all patients were given some type of treatment for the pain upon arrival to the ED. 60% of the patients reported pain relief with 39% reporting no relief. A linear regression showed a significant relationship to reduction in pain by 40% or more and customer service questions that measured doctor patient rapport and distress relief and one indicator of compliance intent. Patients that did not have a reduction in pain levels felt the MD did not understand their reason for coming, allow them to talk about problem, and felt that the treatment was not worth the trouble. **Conclusion:** Reduction in perceived pain levels does directly relate to several indicators of customer service. Patients who experience pain relief during their stay in the ED have significant increased sense of relief distress, rapport with their doctor, and intent to comply with given instructions. **Keywords:** pain management, patient satisfaction, Medical Interview Satisfaction Scale

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FIRST Nations ethnicity is not a risk factor for inadequate analgesia in patients with isolated long bone fractures

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Introduction: Patient race and ethnicity have been shown to affect the prescription of analgesics by physicians to visible minorities in the U.S. and U.K., but no studies have examined First Nations (FN) populations. Our study aims to determine whether differential prescribing exists between FN and non-FN (NFN) populations in patients with isolated long bone fractures. **Methods:** A retrospective chart review was conducted in 3 EDs in Northwestern Ontario for patients presenting between January and May 2008. Patients were included if they had an isolated fracture of the radius, ulna, humerus, or femur, based on final ED diagnosis, with radiological confirmation. Patients were determined to be FN if they had a treaty number, lived on a FN Reserve, or self identified as FN ethnicity. Data were abstracted for sex, postal code, fracture type, time of fracture, prior analgesia received, analgesics given in the ED, route of analgesia administration, and prescriptions given on discharge. Patients were excluded if they were acutely intoxicated or suffered from polytrauma. Data were reabstracted by a second reviewer to assess reliability. Data analyses included descriptive and χ^2 statistics. **Results:** We included 542 patients, and excluded 387. Of those enrolled, 181 were FN (33.4%) and 361 NFN (66.6%) patients. Mean ages were 29.2 for FN and 45.8 for NFN ($p < 0.0001$) and females comprised 56.9% of FN v. 55.7% of NFN patients. Analgesia was given to 66.3% of FN patients v. 65.4% of NFN ($p = 0.45$). Opiate analgesia was given in 31.5% of FN v. 37.7% of NFN patients ($p = 0.26$) and parenteral opiates were used in 29.3% of FN v. 34.1% of NFN patients ($p = 0.91$). On discharge from the ED, 29.3% of FN v. 28.8% NFN were given a prescription for analgesics ($p = 0.91$). **Conclusion:** We found no significant difference in ED delivery of analgesia to FN compared to NFN patients. This suggests that previously described racial and ethnic biases do not apply to Canadian ED FN patients with painful conditions. **Keywords:** First Nations people, inadequate analgesia, long bone fractures

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PEDIATRIC mental health care in Edmonton's emergency departments

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Introduction: Research examining clinical management of pediatric mental health care provided in the emergency department (ED) is limited. This retrospective chart review examined ED use by children and youth in Edmonton with mental health presentations and health service delivery features. **Methods:** This study was based on published methodological guidelines for emergency medicine chart reviews and included standardized abstraction forms, abstractor training and monitoring, and double data entry. Charts from 583 mental health visits to 2 Edmonton EDs by children and youth < 19 years of age between 2004 and 2006 were reviewed. Variables of interest included morbidity, psychiatric health care profile, ED care, and demographics. **Results:** More females attended the ED for a mental health need (56.1%) as did more youth (13–18 yr) (84.9%). Presentations for substance use accounted for 27.6% of all visits followed by behavioural/emotional disorders (e.g., conduct disorder) (20.2%). The most common psychiatric assessment conducted across presentations was for suicidality (66.2%) followed by

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assessment of mood states (48.8%). Suicidality assessments were more documented in presentations for mood disorders (93.0%) than physical injury secondary to intentional self-harm (76.5%). Most mental health patients received some form of brief counseling (67.6%). Follow-up with a current psychiatric care provider or community service were most frequently recommended on discharge (37.2%); 23.5% of charts were not explicit in outlining recommendations. **Conclusion:** Substance use represented over one-quarter of ED mental health presentations and 13–18 year olds constituted the majority of patients. While medical management of substance use and self-harm appeared to be adequately addressed/documented for mental health patients, educational initiatives and clinical care pathways may help standardize the implementation of psychiatric assessments. Pathways may also help to improve discharge recommendations for community-based follow-up. **Keywords:** mental health, pediatrics, health records review

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IMPACT of an observation unit and an emergency admitted patient transfer mandate in decreasing overcrowding in a pediatric emergency department: a discrete event simulation exercise

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Introduction: The primary objective was to examine the effects of a simulated observation unit (OU) and a transfer mandate for admitted patients on pediatric emergency department (PED) patient flow indicators. The secondary objective was to report on the occupancy rate of the simulated OU. **Methods:** Simulations were conducted using a previously designed and validated discrete event simulation (DES) model of our PED operations. A simulated OU was designed and an emergency admitted patient transfer mandate (ETM) was developed and then applied to DES model. Four scenarios (regular PED operations with and without a 5 bed OU and transfer mandate in all combinations) were modeled. **Results:** A combination of an OU and ETM resulted in reductions in time to be seen by a physician and length of stay in patients that were triaged with urgent or emergent presentations as compared to PED operations with neither an OU, nor transfer mandate. Small improvements in fractile response were observed for patients triaged with urgent presentations. The OU without the transfer mandate had a simulated occupancy rate of 73.1%. The inclusion of the transfer mandate reduced the occupancy rate to 48.1%. **Conclusion:** Simulation scenario analyses predict that an OU and a transfer mandate would reduce overcapacity in the PED, with more substantial reductions in time to be seen and length of stay for patients of high acuity. **Keywords:** ED crowding, observation unit, pediatrics

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INTIMATE partner violence: development of a brief risk assessment for the emergency department

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Introduction: Women assaulted by intimate partners are frequently patients in emergency departments (ED). Many victims and health care providers fail to take into account the potential risks of repeat partner violence. The objective of this study is to use data from a larger study of domestic violence risk assessment methods to develop a brief assessment for acute care settings to identify victims at highest risk for suffering severe injury or potentially lethal assault by an intimate partner or former partner in the future. **Methods:** Victims of intimate partner violence (IPV) were interviewed twice between 2002 and 2004. The baseline interview included the 20 items of Campbell's Danger Assessment (DA) (predictor). The follow-up interview, conducted 9 months later on average, assessed abuse inflicted since the baseline interview (outcome). Multiple logistic regression was used to identify questions most predictive of severe abuse and potentially lethal assaults. Female IPV victims were recruited from New York City (NYC) family courts, Los Angeles (LA) County Sheriff's Department 911 calls, NYC and LA shelters, and NYC hospitals; 666 women responded to the DA at baseline and 60% participated in follow-up interviews. **Results:** 14.9% of retained study participants experienced severe injuries or potentially lethal assaults between the baseline and follow-up interviews. The best brief prediction instrument has 5 questions. A positive answer to any 3 questions has a sensitivity of 83% (95% CI 70.6%–91.4%). **Conclusion:** This instrument can help predict which victims may be at increased risk for severe injury or potentially lethal assault and can aid clinicians in differentiating which patients require comprehensive safety interventions. **Keywords:** intimate partner violence, screening, risk assessment

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CAN basic life support providers administer epinephrine safely in anaphylaxis?

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Introduction: Epinephrine is a first-line agent for the treatment of anaphylaxis. Although widely used in the prehospital setting, little is known about its safety when used by basic life support (BLS) emergency medical technicians (EMTs) for this condition. **Objective:** To describe the safety and effectiveness of epinephrine used by BLS EMTs for anaphylaxis. The primary outcome measure is the frequency of adverse outcomes. Secondary outcome measures include EMT diagnostic accuracy, physiologic changes post epinephrine administration and hospital admission rate. **Methods:** Retrospective chart review of prehospital and hospital records by a trained reviewer of all patients who received prehospital epinephrine between 2002 and 2006. Major and minor adverse outcomes were defined a priori. Physiologic data were measured prior to epinephrine administration and at hospital arrival. The final inhospital diagnosis was used to determine prehospital diagnostic accuracy. Means and 95% confidence intervals (CI) are presented. **Results:** 693 patients received prehospital epinephrine during the study period. Inhospital data was available for 647 patients of which 602 (93%) had a final inhospital diagnosis of an allergic reaction. Six major adverse events occurred in 4 patients while 152 minor adverse events were described in 133 patients. Patients demonstrated an average decrease of 3.45 (95% CI 2.78–4.14)) breaths per minute, a decrease in pulse of 6.36 (95% CI 4.82–7.89), and an increase in systolic blood pressure of 10.14 (95% CI 7.85–12.43). Six patients (0.93%) died while in hospital, 67 (10%) were admitted to the hospital and 7 (1%) were admitted to the ICU. **Conclusion:** This study describes the course of patients treated with epinephrine for anaphylaxis by BLS EMTs. There was a low frequency of major adverse events, while minor events occurred more frequently. Improvements in vital signs were noted following epinephrine administration. These findings suggest that epinephrine can be safely administered by BLS EMTs for anaphylaxis. **Keywords:** prehospital care, anaphylaxis, epinephrine

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PREVALENCE and characterization of MRSA in a general population in Toronto

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Introduction: In the USA, community-acquired methicillin-resistant *Staphylococcus aureus* (CA-MRSA) has replaced methicillin-susceptible S. aureus (MSSA) as the primary cause of SSTI's. Commonly cited risks for CA-MRSA infection include factors associated with homelessness. We have previously reported a 12% MRSA colonization rate in homeless men in Toronto in 2008, which has increased 3-fold since 2007. In 2005 the prevalence of MRSA colonization in a Toronto urban teaching hospital family practice unit (FPU) was 1.5%. The current prevalence of MRSA colonization in the general population in Toronto is not known. In this study we describe current MRSA colonization rates in a general population attending the FPU of an urban teaching hospital. **Methods:** Between June 6 and August 15, 2008, a convenience sample of 190 FPU patients provided nasal and axillary swabs, and answered a questionnaire regarding risk factors for MRSA colonization. Swabs were enriched and selectively cultured for MRSA and MSSA, which were identified using standard methods. MRSA were typed by SmaI PFGE and SCCmec typing and presence of PVL was determined by PCR. We use simple descriptive statistics, and multiple regression analysis for risk factors associated with MRSA. **Results:** 54/190 (28.4%) and 2/190 (1.1%) individuals screened positive for MSSA and MRSA respectively. By comparison, 132 (41%) and 38 (11.8%) individuals screened positive for MSSA and MRSA in a high risk homeless population. 2 distinct MRSA isolates were found: 1 hospital-acquired (HA) strain (CMRSA-2/USA-100, SCCmec type II, pvl NEG), in an individual known to be colonized with this strain, and 1 CA-MRSA strain (unknown CMRSA/USA type, SCCmec type IVc, pvl NEG) in an individual not previously known to be colonized. This population had significantly fewer risk factors overall for MRSA colonization, compared to a homeless group. The overall low colonization rate prevented any further analysis. **Conclusion:** MRSA colonization rates in a healthy low risk population in Toronto are low. **Keywords:** MRSA, skin and soft tissue infections, colonization

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NATIVE Canadian children and the Broselow Tape

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Objective: During resuscitations, the Broselow Tape (BT) is the standard method of estimating pediatric weight based on body length. The Native population in Canada is both larger and more prone to injury than its non-Native counterpart, which raised the concern that the BT may not accurately estimate weight in this population. The purpose of this study was to validate the BT in Native Canadian children. **Methods:** A search of a community health centre electronic medical record which serves 3 local Native reserves was performed. The search was for patients less than 10 years of age with a postal code indicating residence on a reserve. The patients' actual weight was compared to their BT weight estimates using the Bland-Altman method. The Spearman's coefficient of rank and percentage error (PE) was also calculated. **Results:** A total of 164 children were included in the study (83 girls and 81 boys). The mean age was 31.3 months (95% CI 27.0–35.6), mean height was 89.8 cm (95% CI 86.5–93.1), mean weight was 15.5 kg (95% CI 14.1–16.8) and mean BT weight was 13.4 kg (95% CI 12.4–14.3). Bland-Altman percent difference was 11.7% (–18.7 to 42.2). Spearman's coefficient of rank correlation (rho) was 0.963 ($p < 0.0001$). The BT had a PE > 10% error 33% of the time and > 20% error 19% of the time. **Conclusion:** The weight of Native Canadian children was often underestimated by the Broselow Tape and was often not accurate. **Keywords:** First Nations people, pediatrics, Broselow Tape

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THE INFLUENCE of a system-wide strategy to reduce emergency department overcrowding on acute asthma care: a controlled clinical trial

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Introduction: Emergency department (ED) overcrowding is one of the most pressing health care issues in developed countries. In 2006, Capital Health (CH) initiated the Emergency Solutions and System Capacity (ESSC) project to address ED overcrowding and patient-flow issues; the first components of the 15-intervention ESSC strategy were implemented in January 2007. This study was designed to examine the effect of the ESSC strategy on accepted quality of care markers for acute asthma at academic and community hospital EDs. **Methods:** Retrospective chart reviews were completed of a random selection of 400 patients/period with asthma to examine the quality of care. Four 6-month periods from 01/06 to 12/08 were examined (baseline, 6, 12, and 18 months post-ESSC). The outcomes were time to assessment and evidence-based care. ANOVA and χ^2 statistics were used to compare different time periods. **Results:** To date, 2 cycles of chart reviews have been completed; the study populations were similar between the study periods. Primary quality outcomes such as median time to care (71 [PRE] v. 62 [POST] mins; $p = 0.1$), time to first beta-agonist treatment (77 v. 72 min; $p = 0.31$), and time to corticosteroid treatment (101 v. 88 min; $p = 0.34$) remained unchanged (all $p > 0.05$) following this system-wide strategy. Overall, lengths of stay (LOS) for admitted patents increased by more than 7 hours while LOS for discharged patients remained unchanged (238 v. 230 min; $p = 0.32$); admission rates were stable over time (7% v. 6%). **Conclusion:** Based on early results, the ESSC does not appear to have improved ED crowding measures; moreover, there is evidence that care delays have increased for admitted patients. Not surprisingly, quality of care indicators for asthma have remained unchanged during this study. Further work is required to understand the delays in acute asthma care and interventions to eliminate these delays. **Keywords:** emergency department overcrowding, asthma, quality of care

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WAITING room assessment: a survey of patient satisfaction

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Introduction: Calgary's 3 adult emergency departments (ED) have recently adopted a new process enabling physicians to assess patients in the waiting room (WR) before an ED stretcher becomes available. This change should reduce delays to physician exam, time to diagnostic testing and overall ED length of stay. The objective is to improve patient satisfaction and increase safety, especially for CTAS Level 3 patients who often have potentially serious illnesses and are most likely to face prolonged WR delays. Our objective is to explore patient perceptions of the "waiting room assessment" process and to determine if this intervention improves other markers of care quality. **Methods:** CTAS 2–3 patients who have been triaged to the WR or hallway for at least one hour are eligible for inclusion. Those who undergo WR assessment (intervention cohort) will be compared to matched controls in the same triage category who do not, and eligible subjects will be invited to complete a patient satisfaction survey. Outcomes will include patient satisfaction, perceptions of care quality, ED length of stay, and 72-hour ED revisit rates. **Results:** Previous studies have shown that process redesign in the ED can improve patient satisfaction. Waiting room physician assessment is an intervention not yet described in the literature. Previous studies have

shown that waiting time to physician is a key predictor of patient satisfaction. The results of this study will help us determine if this intervention improves patient experience, meets expectations for care quality, and reduces total ED length of stay. **Conclusion:** If WR assessment enhances patient satisfaction, meets care quality expectations and improves operational outcomes, it could be considered a potentially important intervention to reduce wait times and improve ED care. **Keywords:** waiting room medicine, patient satisfaction, survey research

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ACCURACY of emergency medical information on the Web: update 2008

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Introduction: The study sought to build upon on the 2004 study, by determining whether the completeness and accuracy of emergency medical information available online has improved over time. Further, we will evaluate the correlation between website accuracy and common credentialing criteria. **Methods:** The top 12 internet health care information as determined by internet traffic were reviewed. "Gold standard" checklists were created from information provided by ASA, ACEP, NIH, AHA to evaluate medical content on each of the websites for 4 diagnoses: myocardial infarct, stroke, influenza, and febrile child. Each website was evaluated for descriptive information, completeness, and accuracy. Completeness was defined as total number of checklist items found while accuracy was based on absence of incorrect or dangerous information. Descriptives, frequencies, and correlation were calculated using SPSS. **Results:** Three of the 15 sites were excluded. Completeness of sites ranged from 46% to 80% of total checklist items found. The median percentage of items found was 72. Two sites, MSN Health and Yahoo! Health, contained the greatest amount of medical information with 98/123 checklist items found for each site. Healthology was the least complete website, containing 57/123 items. All websites save one, Healthology.com, contained greater than 50% of aggregated checklist items, with the majority (7/12) containing greater than 70%. No significant correlation was found between credentialing and completeness of site (correlation coefficient = –0.385) or credentialing and site popularity (correlation coefficient = 0.184). The 4 sites evaluated for improvement in content over time found the mean percentage of checklist items increased significantly. **Conclusion:** This study indicates that the completeness and accuracy of online emergency medical information available to the general public has improved over the past 6 years. No dangerous or inaccurate information was found in this study in contradiction to the prior study. **Keywords:** public education, internet health care information, accuracy

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TRANSIENT ischemic attack referrals from the emergency department: a retrospective medical record review

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Introduction: Cerebrovascular accident (CVA) rates are recognized to be high following a diagnosis of transient ischemic attack (TIA). A number of investigations are recommended on an urgent basis to detect treatable risk factors for subsequent CVA. Some clinicians recommend admission to facilitate rapid completion of these investigations. The primary objective of this study was to determine investigational results, medication changes, and subsequent event rates for TIA clinic patients referred from the emergency department (ED). **Methods:** A retrospective medical record review was completed for adult (> 17 yr) patients presenting to a TIA clinic referred from the EDs of an academic tertiary care centre (combined annual volume 140 000) from April to September 2007. Independent double data abstraction by trained research personnel was completed for all charts. **Results:** Eighty of 117 (68.4%) patients seen in the TIA clinic and referred from the ED were investigated with a carotid Doppler. None required a carotid endarterectomy. Forty-eight (41%) had an echocardiogram with 5 (10.4%) requiring Coumadin for positive findings. Thirty-two (27.4%) patients completed holter monitoring with 3 (9.4%) having atrial fibrillation detected. Antiplatelet therapy was initiated or escalated in the ED for 60 (51.3%) patients and 17 (14.2%) patients in the TIA clinic. Six (5.1%) patients had new TIA symptoms prior to out-patient follow-up. None required hospitalization. The mean (SD) age was 68 (15.5) years with 42.7% being male. The most frequent ABCD2 score was 3. The median (IQR) time to out-patient follow-up was 5 (3–7) days. At one year, 0.9% required admission for a new cerebrovascular event. **Conclusion:** No patients in this study required a carotid endarterectomy. A small proportion of patients required escalation of therapy after echocardiogram or holter monitoring. Prospective study is warranted to determine which investigations are most useful on an urgent basis to improve outcomes following TIA. **Keywords:** transient ischemic attack, diagnostic evaluation, health records review

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A CURRICULUM evaluation of a low-fidelity simulation course on in-hospital resuscitation for resident physicians

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Introduction: While emergency physicians initially resuscitate patients arriving at a hospital, resident physicians attend the majority of in-hospital resuscitations. The objective of this study was to evaluate the effectiveness of an in-hospital resuscitation course for resident physicians. **Methods:** A 2-day, low-fidelity simulation, case-based curriculum was designed based on a needs assessment involving cardiologists, intensivists and internal medicine attendings. A pilot version was modified based on participant feedback. Course participants were electronically surveyed in a blinded fashion 1 month pre- and 1 month postcourse using a modified Dillman methodology. Responses were collated using descriptive statistics, including median and interquartile ranges for each domain surveyed. Institutional ethics approval was granted. **Results:** The response rate was 93% ($n = 27$) pre- and 85% ($n = 23$) postcourse. Precourse only 24% agreed that residents received adequate in-hospital resuscitation training, while 28% felt prepared to lead a resuscitation. Only 4% agreed that attending physicians supervised in-hospital resuscitation. Postcourse 45% of participants self-reported using course knowledge and skills during an in-hospital resuscitation. Significant self reported changes in median confidence scores pre- to postcourse included: management of bradycardia ($p < 0.01$); management of narrow complex tachycardia ($p = 0.02$); management of septic shock (0.03); management of anaphylactic shock ($p < 0.01$); management of status epilepticus ($p = 0.01$); defibrillation ($p = 0.02$); electrical cardioversion ($p < 0.01$); and central venous access ($p = 0.02$). **Conclusion:** This study suggests an educational need for resident physicians. Precourse respondents felt unprepared and unsupervised to lead an in-hospital resuscitation. A low-fidelity simulation course improves self-reported confidence in resuscitation knowledge and skills. **Keywords:** in-hospital resuscitation, low-fidelity simulation, curriculum evaluation

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FAILURE mode effects analysis (FMEA) determination of high risk CPR components for out-of-hospital pediatric cardiac arrest

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Introduction: Reports of poor quality CPR by EMS providers led to widespread attention to CPR quality metrics for adult resuscitation. Although no data explicitly states this, it is likely that similarly poor quality CPR is performed for the pediatric patient. We performed a failure modes and effects analysis (FMEA) to identify error-prone components likely to contribute to poor quality CPR for pediatric patients. **Methods:** Internet-based FMEA exercise of EMS experts from a 12 community pediatric research collaboration. An inventory of BLS errors produced by modified Delphi approach included 44 items for 7 failure domains: failure in assessment, failure of commission, and failures to: act, establish patent airway, properly ventilate, provide effective compressions, and continue resuscitation efforts. Errors were ranked from 1 (lowest) to 5 (highest) for 3 indices: severity, likelihood of occurrence, and likelihood of detection. The product of these indices, the Risk Priority Number (RPN), determined the overall risk of each error. **Results:** The 42 expert panelists were 33% EMS medical directors and 67% paramedic supervisors with 11.6 (SD 8.3) and 22.2 (SD 6.6) years of experience. There were 22 high risk errors (RPN > 24), 7 moderate risk (RPN 18–24), and 15 low risk (RPN 1–18). The majority of high risk errors were from 2 domains: ventilations and compressions. The top 7 error-prone actions were (RPN): insufficient depth of compressions (46), ventilation rate too fast (45), insufficient chest recoil between compressions (43), ventilations too large or forceful (40), compressing for too long before switching (40), prolonged interruptions for compressions (39), too few compressions per minute (38). **Conclusion:** FMEA identified high risk pediatric CPR components similar to those quality metrics now emphasized in the most current American Heart Association CPR Guidelines. FMEA can inform focused interventions for EMS training and just-in-time clinical interventions to enhance delivery of high quality CPR for children. **Keywords:** failure mode effects analysis, out-of-hospital pediatric cardiac arrest, high risk CPR components

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EVALUATION of emergency physicians (EP) intubation practice before and after the introduction of videolaryngoscopy (VDL)

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Introduction: VDL has been shown superior for difficult real or simulated intubations setting in controlled anesthesia studies. Nonetheless, no study has evaluated the utilization of VDL in emergency department (ED), following wide implementation. Our main objective was to evaluate the frequency of the VDL over the complementary difficult intubation techniques (CDIT). **Methods:** Design: A retrospective pre and post study of intubated patients of a university-affiliated level – 1 trauma centre between 04-2004 and 5-2008 was realized. Introduction of VDL was accomplished on 05-2006. **Population:** Patients aged 16 years and more, intubated in ED, were randomly extracted from clinical-administrative databases. Outcome: The proportions of intubation with VDL, CDIT or direct laryngoscopy. **Analysis:** Profile of patients, intubators and intubation techniques pre and post introduction were compared with univariate analysis. Interobserver agreement was realized. **Results:** Three-hundred intubated patients, 150 for both pre and post phases, had a similar profile of disease. The main reason for intubation was nontraumatic altered states of consciousness 56 (pre = 56%; post = 66.0). The average patients' age was 57.4 (SD 17.5). The rapid intubation sequence method has been used for 117 patients (78.0%). Intubation was successful on first attempt for 128 patients (85.4%). VDL was initially used for 25 intubations (16.7%) compared to 2 (1.3%) CDIT, in pre phase ($p < 0.001$). Profile of intubator was equivalent between phases. A preference for the VDL has been noticed for the patients with nontraumatic shock and EP intubator. **Conclusion:** VDL technology has been rapidly integrated into the EP practice, by being the initial method of intubation in ED for almost 1 patient out of 6. Those findings may have an implication for future educational standards and efficacy of VDL in ED should be assessed in a controlled setting. **Keywords:** videolaryngoscopy, complementary difficult airway techniques, pre- poststudy

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UNDERSTANDING contributions of organizational change culture and capacities when implementing a hospital-wide patient flow improvement intervention

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Introduction: Hospital-wide patient flow improvement processes to decrease ED waiting times are complex and require crucial staff engagement and management leadership to ensure sustainability of the change goal. Our aim was to identify and test the contribution of organizational factors that may serve as barriers or facilitators to implementation success. **Methods:** Survey measures were identified by literature review. Hypotheses were generated specific to the hospital change intervention under study defining 8 change capacity constructs. The self-complete survey was pilot tested among staff at a large community hospital implementing a process improvement pilot program. Survey data were analyzed and a weighted average composed construct scores. We conducted a combined analysis of qualitative data to inform and validate constructs under consideration. **Results:** Candidate measures (86) were identified. The pilot survey contained 49 items on a scale of 1–5 across 8 constructs: openness of professional communication (3.3); perceived quality of intra- (3.0) and interprofessional communication (2.9); psychological safety (3.5); goal importance (1.9); goal congruence (3.0); senior management support/prioritization of the goal (2.8); and participatory/informed leadership (2.9). ED (15), general medicine (22) and senior admin (8) staff completed the survey; and participated in focus groups (23) and in-person interviews (3). Qualitative data suggest coordinated communication and senior management support are essential to implementation success; and an overall increased capacity to engage in change efforts was highlighted as result of the pilot. **Conclusion:** We developed a survey to understand organizational factors that may influence implementation success of a hospital process improvement intervention to improve ED-waiting times. Qualitative data provide an increased understanding of the organizational context of communication nodes and gaps; and increased insight to the overall impact and sustainability of improvement efforts. **Keywords:** organizational change culture, flow improvement, survey research

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EVALUATION of usefulness and determination of the cut-off values of S-100B and triage stroke panel immunoassay to exclude significant neuronal injury in minor head injury patients

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Introduction: Patients with minor head injury have a small risk of intracranial haemorrhage. CT scan is relatively expensive and may not always be available. The aim of the study is to determine whether biochemical markers can be used to identify CT scan positive intracranial injury in minor head injury patients presenting to the emergency department. **Methods:** Design: prospective con-

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trolled clinical trial. Patient must fulfill all of following: more than 21 years of age, history of head injury, time from injury to blood sampling less than 3 hours, GCS greater than or equal to 13 on admission (no minimal GCS if patient is intoxicated by drug/alcohol) and CT scan indicated. Exclusion criteria: neurological deficit or localizing sign, unstable patients in need of resuscitation, or multiple injury patients. Intervention: serum S-100B (Roche) and whole blood triage stroke panel biosite immunoassay point of care testing (comprise B-type natriuretic peptide, D-dimer, matrix metalloproteinase-9 and S-100B) of the patients were measured. Treating physicians were blinded to blood test results. The decision to CT scan of the head and subsequent measurement of the patient would be at the discretion of the treating emergency doctor. **Results:** 23 of 104 (22%) patients had a positive CT head: epidural/subdual haematoma (8), subarachnoid haematoma (6), intracerebral haemorrhage (6), combination of above (3). Area under the receiver-operating-characteristic curve sensitivity, specificity, positive predictive value and negative predictive value to diagnose positive CT scan head injury for Roche S-100 (using cut-off value of > 0.2 µg/L) and D-dimer (using the cut off value of > 1550 ng/mL) were 0.673, 100, 34.6, 30.3, 100 and 0.703, 91.3, 49.4, 33.9, 95.2 respectively. The other markers were not useful for diagnosis of positive CT scan head injury. **Conclusion:** This preliminary study showed that a positive S100B and D-dimer were able to predict positive CT scan findings in the above group of minor head injury patients. **Keywords:** minor head injury, S100B, D-dimer

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HOW long before ED arrival might a patient with severe sepsis be identified by paramedics?

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Introduction: Timely recognition and treatment of severe sepsis improves patient outcomes. Our objective was to examine how long before arrival to hospital patients with severe sepsis might be identified by paramedics in an urban EMS system. **Methods:** We conducted a health records review of adult patients transported to a tertiary care hospital ED by EMS and who were later identified as having severe sepsis. Patients were identified by a NACRS database search and data extracted from ambulance, ED, and hospital records. Severe sepsis was defined by SIRS criteria, hypotension, organ dysfunction, and physician diagnosis. Data elements abstracted included patient demographics; patient vital signs, symptoms, physical exam; and process of care time points both prehospital in the emergency department. We conducted descriptive data analyses. **Results:** Of 78 potentially septic patients, 53 were identified with a diagnosis of severe sepsis, and the 30 who were transported by EMS were included in the study. Patients had these characteristics: mean age 63.0 years, 60.0% male, 100% admitted to ICU, 50.0% survived to hospital discharge. Before arrival at hospital, SIRS criteria were met by 70.0%, 50.0% had a GCS < 15, and 56.7% were hypotensive. Median time intervals were: 911 to ED triage 47 min; EMS SIRS identification to triage 33 min; EMS SIRS identification to ED physician assessment 64 min; EMS SIRS identification to ED antibiotic administration 105 min. Median time intervals for hypotensive patients included: EMS hypotension identification to triage 31 min; EMS hypotension identification to ED physician assessment 53 min; EMS hypotension identification to ED antibiotic 133 min. **Conclusion:** Our study shows that paramedic assessment could lead to much earlier ED identification and treatment of patients with severe sepsis. Further study may identify how this should improve transport and triage priorities to optimize timely recognition and treatment of these patients. **Keywords:** severe sepsis, prehospital identification, health records review

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ARE adult patient self-assessments of urgency accurate compared to nurse triage assessments?

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Introduction: Triage delays cause patient dissatisfaction and increase the risk of sick patients waiting in triage queues. If patients can accurately rate illness acuity, triage workload and delays could be reduced by having low acuity patients self triage using e-registration tools. We assessed agreement between patient- and nurse-perceived acuity, and estimated patient sensitivity for detecting high acuity conditions. Our hypothesis was that > 80% of CTAS 1–3 patients and > 90% of CTAS 1–2 patients would accurately identify themselves as high acuity (urgent or life-threatening). **Methods:** Using a cross-sectional mail survey, the Health Quality Council of Alberta surveyed patients seen at 11 urban Alberta emergency departments (ED) from Jan. 27 to Feb. 23, 2007. Surveys included an urgency scale (life-threatening, possibly life threatening, urgent, somewhat urgent, not urgent) analogous to CTAS categories 1–5. Self-assessed acuity was compared to nurse-assigned CTAS categories. Patient accuracy was determined by percent exact agreement, percent agreement within 1 CTAS level, and weighted kappa. **Results:** Adult response rate was 46% and 3611 patients responded, including 0.3%, 20%, 46.9%, 27.6% and 5.1% in CTAS levels 1–5 respectively. Exact nurse–patient agreement occurred in 41.5% of cases (42%, 42%, 32%, 51% and 18% in CTAS levels 1–5) with a weighted kappa of 0.25. Agreement within 1 triage level occurred in 88% of cases (67%, 80.5%, 92.4%, 89.4% and 70.8% respectively) with a weighted kappa of 0.27. CTAS 1–2 patients identified themselves as high acuity in 78% of cases (sensitivity = 78%; specificity = 52%). One CTAS 1 patient (8.3%), 141 CTAS 2 patients (19.5%) and 706 CTAS 3 patients (41.7%) down-triaged themselves into nonurgent categories. **Conclusion:** Nurse–patient agreement is relatively poor, and a significant number of emergent and urgent patients down-triage themselves to nonurgent categories. Patient self-triage may not be safe. **Keywords:** patient severity assessments, CTAS, survey research

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DEEP breathing and pain reduction in the emergency department

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Purpose: The purpose of this study was to measure what impact deep breathing exercises had on pain levels of patients who presented to the ED with pain as their chief complaint. A secondary purpose was to measure what if any impact the teaching of deep breathing exercises had on indicators of patient satisfaction. **Methods:** This was an observational study of patients who present with pain as their chief complaint to an urban level one emergency department. Patients were randomized into a control group and an experimental group. The control group received the usual treatment for pain. The experimental group received the usual treatment for pain, but also received deep breathing exercises. For the measurement of pain prior to treatment the inventory (BPI) is used. The Visual Analogy System (VAS) was used to measure pain prior to and after treatment and deep breathing were administered. For the measurement of patient satisfaction, the Medical Interview Satisfaction Scale (MISS) was used. **Results:** There was no significant difference between those who received the deep breathing education and those that did not with regards to post medication pain levels. There was however, a significant difference in customer service indicator within the area of doctor patient rapport and intention to follow treatment. **Conclusion:** The usefulness of deep breathing exercises was not shown to be effective in reducing pain levels. However, the majority

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of those who received deep breathing education felt it was useful. The exercise was effective in increasing patient's feelings of rapport with and intentions to follow their doctor's directives. **Keywords:** deep breathing, analgesia, randomized controlled trial

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DOES the Broselow Tape accurately estimate the weight of healthy Irish children?

Anstett D, Bawden J, Moylette E, Milne WK; South Huron Hospital, Exeter, ON

Introduction: The Broselow Tape (BT) was developed in the 1980's as a method used during resuscitation to estimate a child's weight based on their length. The BT has become the standard of care in the emergency department; however the issue of increasing childhood obesity has raised concern that the BT no longer accurately estimates weight. The purpose of this study was to validate the BT in healthy Irish children. **Methods:** A retrospective chart review of children attending the Outpatient Paediatric Clinic at University Hospital Galway between September and December 2008 was conducted. Their actual weight was compared to their BT weight estimates using the Bland-Altman method. The correlation coefficient and percentage error (PE) was also calculated. **Results:** A total of 545 children were included in the study. The mean age was 45.6 months (95% CI 42.1–49.2), mean height was 95.3 cm (95% CI 93.1–97.6), mean weight was 17.2 kg (95% CI 16.3–18.0) and mean BT weight was 15.6 kg (95% CI 14.8–16.3). The Bland-Altman difference was 8.6 percent (–17.2 to 34.5). The correlation coefficient (r) was 0.9329 ($p < 0.0001$, 95% CI 0.9225–0.9419). The BT had a PE > 10%, 30.3% of the time and > 20% error 13.4% of the time. **Conclusion:** It was found that the BT was often inaccurate and tended to underestimate the weights of healthy Irish children attending the UGH outpatient clinic. **Keywords:** Broselow Tape, resuscitation, Irish children

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CHARACTERISTICS and outcomes of recently discharged adult patients who have had an out-of-hospital cardiac arrest

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Introduction: When out-of-hospital cardiac arrest occurs, approximately 5% of individuals survive. It is uncertain how many of these cardiac arrest victims were recently discharged from hospital. The objective of this study was to determine the incidence and characteristics of patients experiencing out-of-hospital cardiac arrest within 7 days of hospital discharge. **Method:** A retrospective medical record review was completed for all out-of-hospital cardiac arrests occurring between Oct 2007 and Sept 2008. Data was collected from ambulance call reports and hospital records by 2 trained abstractors to determine the number of patients that were discharged from the emergency department (ED) or inpatient service at the London Health Sciences Centre (LHSC) or any LHSC affiliated hospital within 7 days prior to their out-of-hospital cardiac arrest. **Results:** Emergency medical services responded to 352 out-of-hospital cardiac arrests where resuscitation was initiated and 244 calls where resuscitation was deemed futile. Mean (SD) age was 72 (15) years and 50% were male. Forty of the 596 patients (6.7%) had been discharged from the hospital within 7 days of their out-of-hospital arrest. Inter-rater agreement was 100% ($\kappa = 1$). Twenty-two (55%) patients had been discharged from the ED, while 18 (45%) were discharged from an inpatient ward. Seventeen (42.5%) patients had one or more abnormal vital signs recorded upon discharge (HR > 100, $n = 7$; SBP < 100 mm Hg, $n = 3$; O2 sat < 90%, $n = 2$; temp > 38°C or < 36°C, $n = 5$). Ten percent of patients required > 4 L O2 during their last set of recorded vitals. Nine (22.5%) patients failed to have any discharge vital signs documented. **Conclusion:** Of those patients who had an out-of-hospital cardiac arrest within 7 days of being discharged, 26 (65%) patients had abnormal vital signs or failed to have any discharge vital signs documented. Although causality cannot be established, documentation standards should be improved and alternate disposition of patients with abnormal vital signs should be considered. **Keywords:** out-of-hospital cardiac arrest, ED discharge, health records review

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CORRELATION between clinical streptococcal pharyngitis score and antibiotic prescription practice in a tertiary pediatric emergency department

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Introduction: The goal was to determine the correlation between a clinical streptococcal pharyngitis score and antibiotic prescribed pattern in a tertiary pediatric emergency department. **Methods:** This study was a part of prospective nonrandomized cohort study on streptococcal pharyngitis infection conducted in the Children's Hospital of Eastern Ontario Emergency Department (ED) between September and December 2007. We compared a 4-item clinical streptococcal pharyngitis score (consisting of fever, cervical adenitis, cough, and tonsillar exudates) to the antibiotics prescription pattern. **Results:** A total of 356 children were recruited. There were 183 (51.3%) males with a mean age of 6.76 years (SD 4.52). The median strep throat score was 3. 119 (33.3%) throat swab tested positive for Group A streptococcus. There was a direct correlation between the clinical score and positive throat swab ($p < 0.05$). Antibiotics were given to 31 patients before ED visits, while 49 were started in the ED. The clinical score was not correlated in patients who received antibiotics from ED ($p > 0.05$). **Conclusion:** The clinical streptococcal pharyngitis score had no correlation to the antibiotic prescription practice in a tertiary pediatric emergency department. **Keywords:** streptococcal pharyngitis, antibiotic prescribing, clinical prediction rule

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EMERGENCY physicians make discharge decisions based on clinical judgment rather than evidence

Calder LA, Arnason T, Stiell IG, Forster AJ; Ottawa Health Research Institute, Ottawa, ON

Introduction: To determine the rationale for discharge decisions for high acuity ED patients in terms of use of evidence or specific criteria and to evaluate the probability of misinterpreting tests commonly used in making these decisions. **Methods:** We conducted a real-time structured survey of attending staff physicians for all consecutive patients being discharged from high acuity areas of a tertiary care ED during 6-hour shifts from June to August 2008. We excluded residents, medical students and decisions involving admitted or pediatric patients. To identify errors in interpreting ECGs and chest x-rays, we compared ED physician assessment to final reports. The data were analyzed with descriptive statistics. **Results:** We interviewed 32 of the 36 physicians (88.9% response) for 366 patient encounters. Each physician was interviewed a mean of 10 times (range 4–28). The physicians were 71.9% male and 53.1% had more than 10 years of clinical experience. The most common themes as to the basis of discharge decisions were: resolution or control of patient symptoms (31.4%), normal investigation results (28.7%) and clinical criteria (14.9%). Evidence-based guidelines were used in 9.6% of cases and physicians consulted the literature in 3.0% of cases. Discrepancies in ECG interpretation were noted in 45/211 ordered ECGs (21.3%)

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with 17.8% of cases having minor clinical significance. Chest x-rays had discrepant interpretations in 16.1% (19/118) of cases with 52.6% having minor acute clinical significance. **Conclusion:** Emergency physicians most often rely on their clinical acumen and investigation results rather than evidence-based guidelines when discharging patients from high acuity areas of the ED. This has important implications for emergency medicine patient safety such that efforts to reduce discharge decision errors should be directed towards cognitive processes involved in investigation interpretation. **Keywords:** clinical decision-making, evidence-based guidelines, discharge decisions

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USE of an electronic patient tracking system to facilitate clinical research in the emergency department

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Introduction: Electronic patient tracking systems are commonly used in emergency departments (EDs) to facilitate patient care and monitor ED flow. We report the successful modification of an existing electronic patient tracking system to facilitate planning and conduct of a prospective cohort study. **Methods:** We extracted data from an existing ED registration database for patients with "chest pain," "chest," "pressure," "tightness," "radiating," or "angina" registered as a chief complaint or final diagnosis. These synonyms were then used to generate a list of potentially eligible study participants over a 1-year period. We then implemented an automated notification system triggered by chief complaint data entered into the patient tracking database at the time of ED registration that simultaneously activated an electronic paging system and generated an email. Study coordinators then scanned the email list on a daily basis to determine the number of eligible participants and cross-referenced the list with completed case record forms to determine the number of potentially eligible, eligible enrolled and missed eligible patients. Analyses included descriptive statistics. **Results:** From July 1, 2007 to July 1, 2008 there were 3233 patients with a chest pain related synonym registered as a chief complaint. From November 1, 2008 to December 1, 2008 there were 257 automatically generated electronic notifications. Of these 257 notifications, 150 (58.4%) patients met eligibility criteria. One-hundred twenty-five (83.3%) eligible patients were enrolled, and 22 (14.7%) eligible patients were missed. **Conclusion:** We report the successful modification of an existing electronic patient tracking system to facilitate ED-based clinical research. Our system can be used to assess feasibility for prospective studies, generate real-time electronic notification of potentially eligible participants, and monitor enrollment. **Keywords:** electronic patient tracking, clinical research, study logistics

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FEVER beliefs in parents of young children

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Introduction: Fever is widely viewed as a threat to health and antipyresis has become an important treatment goal. Recent evidence has demonstrated that exaggerated anxiety regarding the consequences of fever and inappropriate fever treatment are widespread in parents from all socioeconomic classes and even amongst health professionals. The objective of this study was to describe Canadian patterns of parental attitudes, beliefs, and actions regarding childhood fever. **Methods:** Parents with children less than 6 years of age presenting to any of 3 urban emergency/urgent care facilities with complaints regarding fever were presented with a written survey consisting of 38 Likert scale questions. **Results:** 784 surveys were completed over a 2.5-year period. Survey respondents represented a wide range of age, parental experience, income, levels of education and ethnicity. Fever was a source of significant concern to parents with 73.9% believing that fever alone could damage their child and 54.4% checking their child's temperature at least every 2 hours during illness. Ninety percent always attempted to lower a fever and 55.7% woke their child in order to give antipyretics. 47.9% believed that temperatures of ≤ 40°C can cause harm. 68.8% did not know how high temperature could rise if untreated. Suggested fever outcomes such as meningitis, brain damage, blindness, coma and death concerned only a minority of respondents (less than one-third) whereas symptoms of fever such as decreased energy, interest in activities, appetite, drinking and urinating worried more than 80% of respondants. Only 10.8% were disappointed when antibiotics are not prescribed and 77.7% felt reassured by a diagnosis of viral illness. Overall, 92% state that they are normally satisfied with medical care regarding fever. **Conclusion:** Fever remains a source of significant concern for parents of young children and they continue to treat fever aggressively. They still have significant knowledge deficits and look to health professionals for answers. **Keywords:** fever beliefs, antipyresis, pediatrics

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ANALYSIS of the interventions carried out in cases of voluntary or accidental calcium channel blocker poisoning in adults in the Quebec and Montréal Island regions

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Introduction: The objective of this study is to evaluate whether physicians' methods of practice are in conformance with the protocol recommended by the Quebec Poison Control Center for the treatment of patients with calcium channel blocker (CCB) poisoning and to compare the outcomes for these patients. **Methods:** This retrospective research was conducted in adults with CCB poisoning who were admitted to one of the 23 hospital centres in the Quebec and Montréal Island regions between January 2004 and November 2007. Using independent variables including decontamination, monitoring and the sequence of interventions, it was decided whether the algorithm was completely or partially followed or not followed at all. The level of care provided, morbidity and mortality were analyzed according to these 3 groups. Variance, covariance and regression analyses will be done so that distorter variables can be taken into account. **Results:** The algorithm was followed for 40 of the 103 recorded cases. A median of 18 hours of intensive care, 2 days of hospitalization, morbidity of 49% and mortality of 6% were objectivized for all of the patients. Acute renal failure (45%), metabolic acidosis (36%) and acute pulmonary edema (22%) were among the most frequent complications. The first analyses tended to show that whether or not the protocol was followed for the patients the results were relatively similar. The 24 patients for whom the protocol was partially followed showed the least favorable results (median of 44 hours of intensive care, 7 days of hospitalization, 21% mortality and 88% morbidity). **Conclusion:** These preliminary results will be completed by complementary analyses but cast doubt on the protocol efficiency. This research is part of a process to develop clinical practice guidelines for the treatment of this poisoning. **Keywords:** calcium channel blocker toxicity, treatment algorithms, health records review

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MOTIVATION in medical education: a systematic review

Brissette A, Howes D; Queen's University, Kingston, ON

Introduction: The purpose of this study was to systematically review

the literature on motivation in medical education, with the intention of providing a framework for educators to be able to consider this important dimension of curriculum development. **Methods:** A search strategy was developed with the help of a professional librarian and run through the Embase, Medline, PsychInfo, and ERIC databases. We included any articles relating to motivation and education, motivation in sports or sports participation, and we excluded non-English language articles. A total of 611 potential sources were independently reviewed by 2 reviewers resulting in 65 included articles. **Results:** The literature on motivation is largely qualitative. We developed a model based on the results of these articles, and discuss some of the motivational research from the fields of cognitive psychology and business. Motivation is the translation of a person's basic psychological needs and drives, filtered through their view of the world, toward an action with an anticipated result. There is a range of motivational states from intrinsically motivated to immotivated; the types of motivation are not dichotomous, and the model itself is fluid. Educators can foster intrinsic motivation by addressing learner's needs for competence, autonomy, and relatedness. Each need fulfilled on its own promotes intrinsic motivation, however, fulfilling all 3 needs at once creates a synergistic effect. The need for competence is fulfilled by providing optimal challenge and positive performance feedback, the need for autonomy by providing choice and opportunity for self-direction, and the need for relatedness by providing a sense of belongingness and connection to the medical profession. **Conclusion:** Motivating the learner may be one of the most important things that an educator does. We propose a model for thinking about motivation as a foundation for studying how to maximize motivation in medical education. **Keywords:** motivation, medical education, systematic review

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BARN door to antibiotic time for pneumonia in a rural emergency department

Smallfield A, Anstett D, Vlahaki D, Milne WK; South Huron Hospital, Exeter, ON

Introduction: The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) has recommended that patients admitted to hospital with pneumonia should receive their first dose of antibiotics within 6 hours of presenting to the emergency department (ED). There are similar recommendations in Canada. Previous research in the United States indicates that rural hospitals may be better at achieving this benchmark than urban centres. This particular quality indicator has not been evaluated in Canada. The purpose of this study was to determine whether the target door-to-antibiotic (DTA) time of 6 hours or less could be met in a rural ED. **Methods:** A retrospective chart review was conducted on patients admitted to hospital with the diagnosis of pneumonia. Descriptive data for each case was collected which included demographic information and the Canadian Triage and Acuity Scale (CTAS) score. Time to first dose of antibiotic, type of antibiotic, method of administration, hospital length of stay, and disposition at discharge was analysed. **Results:** A total of 320 charts were reviewed for patients who were admitted to hospital with a diagnosis of pneumonia between April 1, 2003 and March 31, 2008. The final sample consisted of 143 patients. The mean age was 77.3 years with 50.3% women. The mean DTA time was 216.4 minutes (95% CI 186.3–246.4). There were 81.8% of patients who received their first dose of antibiotics within 6 hours. Patients were treated with antibiotics either orally (47.6%), intravenously (47.6%) or both (4.9%). Single agent respiratory fluoroquinolones were used 65.1% of the time. The mean length of stay in the hospital was 5.5 days. Most patients were discharged home (79.7%). There were 11 deaths (7.7%), 11 transfers (7.7%) and 7 patients (4.9%) discharged to a nursing home. **Conclusion:** A DTA time of 6 hours or less is achievable in a rural ED. **Keywords:** Door to antibiotic time, rural medicine, health records review

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TEST characteristics and utility of Focused Assessment with Sonography for Trauma (FAST)

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Introduction: We sought to measure the test characteristics of a Focused Assessment with Sonography for Trauma (FAST) compared to CT findings in a population of severely injured patients urgently assessed by a trauma service (trauma code). We also compared time intervals from emergency department (ED) arrival to CT and to operating room (OR) among patients evaluated with FAST or not. **Methods:** We reviewed health records from of a level 1 trauma centre (60 000 visits/yr), and identified cases from the hospital trauma service registry. A single reviewer abstracted data using a piloted and standardized data collection sheet. We report test characteristics for FAST with 95% CI using CT as a gold standard, and compared time intervals from ED arrival to CT and to OR using descriptive statistics. **Results:** There were 166 trauma patients between Oct. 2006 and Oct. 2007 with the following characteristics: median age 36 (range 17–87); male 77.7%; arrived by ambulance 86.7%; blunt trauma 80.1%; penetrating trauma 19.8%; admitted to hospital 86.7%; required surgical intervention 9.6%; required laparotomy 4.8%; and died 16.2%. FAST was performed on 35 patients (21.1%), 97% by emergency physicians, the others by trauma surgeons. CT was performed on 129 patients (77.7%). The median time from ED arrival to CT with and without FAST were 68 min (40–165) and 78 min (31–1430). The median time from ED arrival to OR with and without FAST were 117 min (100–125) and 105 min (50–447). 33/35 patients investigated with a FAST also had a CT. 10/14 positive FAST also had a positive CT; 17/21 negative FAST also had a negative CT. FAST had a sensitivity of 71.4% (95% CI 42.2%–90.3%), and a specificity of 81.0% (95% CI 57.6%–93.7%). **Conclusion:** FAST was not commonly used to evaluate trauma victims in our institution, and was slightly more specific than sensitive compared to CT findings. FAST did not appear to significantly influence the urgency of obtaining further CT imaging or operative procedures. **Keywords:** FAST, diagnostic performance, health records review

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THE EMERGENCY department epidemiology of superficial corneal injury

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Introduction: Superficial corneal injuries, composed of corneal abrasions and corneal foreign bodies (FB), are among the most common ocular complaints to an emergency department (ED). The epidemiology of such patients has not been described in either the ophthalmology or emergency literature. **Methods:** The emergency administrative database was used to obtain all ED encounters from August 1, 2005 to June 1, 2008 resulting in a discharge diagnosis of "corneal abrasion" or "corneal foreign body" (ICD 10 codes 505.0 and T15.0, respectively). Information extracted included patient demographics, triage codes, insurance coverage (to determine whether injuries were work-related), ED procedures, and subsequent visits to the ED or ophthalmology. **Results:** 1081 patients were diagnosed with a superficial corneal injury, of which 289 (26.7%) were work-related. Overall, patients had a median age of 39 ± 14 years and 791 (73.2%) were male. 749 patients (69.3%) were diagnosed with corneal abrasions and of those, 99 (13.2%) were referred to an

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ophthalmologist and 76 (10.1%) had one repeat visit to the ED with no patients having more than one. Of the 332 patients (30.7%) with corneal FB, 37 (11.1%) were seen by an ophthalmologist and a further 37 (11.1%) had a follow up ED visit. 268 patients with corneal FB (80.7%) had at least one procedure performed by an emergency physician. (213 FB removals and 104 rust ring removals.) The 289 patients with work-related injuries had a median age of 39 ± 14 years and 272 (94.1%) were male. 154 (53.7%) were found to have corneal abrasions and 135 (46.3%) had FB. Only 13 corneal abrasions (8.4%) and 18 FB (13.3%) were referred and 21 abrasions (13.6%) and 12 FB (8.9%) had return visits to the ED. **Conclusion:** Superficial corneal injuries are a common ED presentation. Only a minority need referral or return to the ED for follow up. Compared with non–work-related corneal injuries, patients with work-related complaints tend to be male and have a corneal FB. **Keywords:** corneal injuries, management patterns, administrative database

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ST-elevation myocardial infarction management time in a Canadian academic tertiary care emergency department

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Introduction: In 2004, the AHA/ACC updated the guidelines to the management of ST-elevation myocardial infarction (MI). Included in these guidelines are time-specific goals in diagnosis and reperfusion treatment, attempting to minimize myocardial ischemic time. **Objective:** The objective of this study was to estimate the prehospital, diagnosis and treatment times for ST-elevation MI in a Canadian academic tertiary care emergency department (ED). A secondary objective was to determine if guidelines were being met and to uncover areas which need improvement to help decrease morbidity and mortality. **Methods:** A retrospective medical record review was completed for a 3-year period (Jan 2005–Feb 2008) that included a convenience sample of adult patients who presented to the EDs of an academic tertiary care centre (combined annual patient volume 125 000) with ST-elevation MI and received either fibrinolysis or primary percutaneous coronary intervention (PCI). Patients were eligible if they arrived with chest pain or equivalent and showed ST-elevation or new-left bundle branch block on their electrocardiogram (ECG) in the ED. **Results:** Two-hundred eleven patients met the inclusion criteria for this review. Of the103 patients who received thrombolysis, median (IQR) time from symptom onset to ED arrival was 71 (45–136) min, 34 (33.9%) patients had a door-to-ECG < 10 minutes; 41 (39.3%) had a door-to-needle time < 30 min. Of the 108 patients who received primary PCI, median (IQR) time from symptom onset to ED arrival was 67 (41–114) min, 39 (36.1%) patients had a door-ECG < 10 min, and 59 (54.6%) had a door-balloon time < 90 min. Patients with prehospital 12-lead ECGs were more likely to meet time guidelines. **Conclusion:** These results suggest that only a minority of ED patients at our centre are meeting the time goals for diagnosis and reperfusion treatment for ST-elevation MI. Overall, there appear to be multiple delays in prehospital care, diagnosis, transfer for primary PCI and thrombolysis. **Keywords:** ST-elevation MI, treatment delays, reperfusion therapy

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SHORT-term functional impact following acute minor thoracic injuries (MTI)

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Introduction: The presence of rib fracture is possibly associated with functional decline after emergency department (ED) evaluation. Our objective was to evaluate functional impact and pain score at 1 month after MTI. **Methods:** Setting and population: A prospective cohort study in a university-affiliated ED was conducted over 6 months as part of a larger cohort study of MTI. Patients more than 16 years old with a MTI (defined as either abrasion, contusion, suspected rib fracture or confirmed rib fracture) were included. Patients were examined in an out-patient clinic until 14 days post-MTI. Phone interviews were done at 1 month to assess main outcomes. **Outcomes:** Functional outcomes were assessed with the SF-12 questionnaire. Data analysis: Mean Physical health (PHS) and Mental health scores (MHS) were compared using Student *t* tests [+ SD]. Specific subgroup evaluations by number of confirmed rib fractures, presence of complications and delayed hemothoraces (DHx) were planned for patients > 65 years of age. **Results:** One-hundred sixty-five patients were included. Mean SF-12 scores were: PHS = 48.4/100 [23.9/100] and MHS = 62.8 [22.6/100]. Bodily pain was important with 50.0 [32.9] / 100. Thirty-four (20.2%) patients were 65 years old or more and their PHS and MHS scores were not significantly different from the younger group. The number of rib fractures was not associated with significant variation in 1 month SF-12 scores. DHx was present in 12 subjects (7.2%) and was associated with a significant difference in PHS, 34.8 [23.5] versus 49.5 [23.6] (p = 0.04). Bodily pain remains an important functional component in DHx groups with 37.5 [27.2] versus 51 [33.2] (p = 0.06). The PHS difference remain significant in the 65-year-old with DHx, 7.0 [8.1] versus 54.7 [24.4] (p = 0.01). **Conclusion:** Bodily pain seems to have an important impact at 1 month following MTI. Moreover, patient with DHx have a functional decline on short-term follow-up. Future evaluations of functional impact on long-term is needed in this population. **Keywords:** minor thoracic injuries, functional impact, survey research

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OUTPATIENT management of spontaneous pneumothorax: a 10-year review

Émond M, Villeneuve J, LeSage N, Chabot P; Laval University, Québec City, QC

Introduction: Spontaneous pneumothorax (SPP) is a frequent pathology encounter by physician in the emergency department (ED). However, little is known on outpatient management from the ED with tube thoracostomy. The objective was to evaluate the use of an outpatient tube thoracostomy management protocol using Heimlich valve. **Methods:** Design and Population: A retrospective cohort study over 10 years of all SPP drained by primary/ED doctors was accomplished at a university-affiliated ED. The decision to use the outpatient management protocol was made by the attending physician. Chart review identified main outcome and possible predictors of protocol failure. Interobserver agreement was realized. Outcomes: Mortality, morbidity and failure proportion composed the main outcomes of the study. Data analyses: Univariate analyses of patient profiles provided the outcome measures. Multiple logistic regression and recursive partition analyses were realized to determine possible predictors of protocol failure. **Results:** One-hundred fifty-six charts were evaluated, 50 patients (32%) were treated with the outpatient management protocol, 126 were directly admitted. Patients' clinico-demographic profile were similar. No death occurred. Complications proportions were similar in both groups. Thirty-four (68%) patients were successfully treated on an ambulatory mode with Heimlich valve. Recursive partitioning showed that active smokers with early ED consultation (< 24 h) had a higher risk of failure (14/16 [87.5%]). Median length of stay was 5 days in the group of directly admitted patient compared to 6, 2 in the outpatient failure group. **Conclusion:** The application of an outpatient management protocol of SPP with Heimlich valve after the insertion of

tube thoracostomy in the ED seems safe. Active smoker with early ED consultation are at higher risk of failure. Broader application of the protocol could lower significantly the use of in-hospital resources. **Keywords:** spontaneous pneumothorax, outpatient management, health records review

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RETURN visits to the emergency department among febrile children

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Introduction: Returning to the ED may increase crowding. We wanted to determine characteristics of febrile children 3–36 months seen and returned to the ED within 72 hours, and compare them to a matched population who did not return. Of particular interest we wanted to look at demographic variables and extent of the evaluation in the ED. **Methods:** We reviewed health records of patients 3–36 months old during 3 months with a chief complaint of fever who were discharged from the ED. We compared the "return group" — patient who returned to the ED within 72 hours and age-matched "control group" of 3 consecutive patients (+ 1 month) with fever who did not return to the ED. **Results:** We included 488 visits — 183 returned to the ED within 72 hours and 305 did not return. The average temperature at home in children who returned to the ED was higher ($p = 0.008$) and the duration of fever was longer by a day ($p < 0.01$). Patients presenting with pain tended to return more frequently ($p = 0.03$).There was no difference between the groups in the rate of obtaining blood cultures. No differences found between the first and second visit in the "return group." **Conclusion:** Higher temperature is associated with returning to the ED and educational efforts among parents should be considered to disconnect height of temperature and need to return to the ED. Pain should also be dealt early on in the ED visit, as this may be associated with returning later to the ED. **Keywords:** ED revisits, fever, pediatrics

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The Broselow Tape underestimates the weight of rural children

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Introduction: The Broselow Tape (BT) has been used for more than 20 years as a length-based estimate of body weight for children during resuscitation. Increasing childhood obesity has raised concern that the BT no longer accurately estimates weight. However, this tool has never been validated in a rural population. The purpose of this study was to validate the BT in rural children. **Methods:** All parents of students in junior kindergarten to grade 4 in the Avon Maitland District School Board were asked permission to measure their child. Measurements were done in the spring of the 2008 academic year. A data base search of the Maitland Valley Medical Centre was performed on children from zero to 4 years of age. The actual weight of children was compared to their BT weight estimates using the Bland-Altman method. The correlation coefficient and percentage error (PE) were also calculated. **Results:** A total of 1268 children were included in the study. The mean age was 62.7 months (95% CI 59.9 to 65.6), mean height was 108.2 cm (95% CI 106.9 to 109.5), mean weight was 20.6 kg (95% CI 20.0 to 21.1) and mean BT weight was 19.4 kg (95% CI 19.0 to 19.9). Bland-Altman difference was 4.4% (–18.5 to 27.4). The correlation (Spearman's) r = 0.971202 ($p < 0.0001$). The BT had a PE > 10% 27.9% of the time and > 20% error 7.8% of the time. **Conclusion:** The Broselow Tape was often not accurate and tended to underestimate the weight of rural children. **Keywords:** Broselow Tape, rural populations, resuscitation

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PREVALENCE of advance directives among elderly patients attending an urban emergency department

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Introduction: Our study aimed to capture all comers over the age of 70 to the Vancouver General Hospital Emergency Department (ED), an urban academic ED with 70 000 visits per annum. The goal of this questionnaire-based study was to assess this populations' knowledge of and interest in advance directives (AD). **Methods:** This study ran between October 2008 and December 2008. We collaborated with a previously established team of ED nurses who specialize in assessment of geriatric patients. Their practice involves assessing individuals over the age of 70 who present between 0700 and 1900, 7 days a week. They evaluate patients independence in activities of daily living, instrumental activities of daily living, social supports and need for further community intervention. The study questionnaire included 28 questions covering demographics, education, medical information, and knowledge and attitudes towards ADs. Due to lack of informed consent, patients who were unable to communicate in English or had significant cognitive impairment were excluded unless they arrived with a previously established AD. **Results:** We collected 280 questionnaires. The average age was 80.6. 91.4% were fluent in English. 97.9% had a family doctor and 15.4% reported having a life-threatening disease. 35% had some knowledge of ADs, and 19.3% actually possessed an AD. While 67.9% of subjects felt it was important for physicians to know their wishes about life support, only 50.7% were interested in further information regarding ADs. **Conclusion:** As previously reported the prevalence and knowledge of ADs in Canada is low. This was the first study in Canada looking specifically at patients over the age of 70 in an ED setting. Despite potential sampling bias this study demonstrated lower than expected patient interest in the subject. Presenting author: Dr. Gina Gill, Emergency Medicine Resident, UBC, VGH, Vancouver BC. **Keywords:** advance directives, geriatrics, do not resuscitate orders

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FOLLOW-up of patients treated with the Ottawa Aggressive Protocol for acute atrial fibrillation or flutter

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Introduction: Acute atrial fibrillation (AAF) and flutter (AAFL) are frequently encountered in the ED yet there is little consensus on optimal treatment. We sought to evaluate the efficacy, safety, and follow-up outcomes of the Ottawa Aggressive Protocol (OAP) for rapid rhythm control of AAF and AAFL in the ED. **Methods:** This health records review included a consecutive cohort of adult patient visits with new-onset AAF or AAFL, treated with the OAP at 2 university hospital EDs during an 18-month period. Cardioversion was attempted by ED physicians for all patients with either IV rhythm control medication or electrical cardioversion or both. Outcomes included conversion to sinus rhythm, adverse reactions, and 30-day information collected from records or telephone follow-up. We conducted descriptive data analyses with 95% CIs. **Results:** Among 821 visits reviewed, 385 (46.9%) had cardioversion attempted and had these characteristics: mean age 62.4 years (range 21–97), male 63.4%, mean heart rate 119.1 (range 54–239), mean duration of symptoms 4.0 hours, AAF 86.0%, AAFL 14.0%. 47.3% of cases received IV rate control drugs prior to rhythm control. Rhythm control medication was given to 64.9% patients with conversion rates of 42.3% for AAF cases and 25.9% for AAFL (overall success: procainamide 42.5%, amiodarone 9.5%, vernakalant 70.0%). Electrical

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cardioversion was attempted for 67.9% visits with 90.3% success rate. 93.5% of patients were discharged home, with 91.4% in sinus rhythm. 8.8% had minor adverse reactions in the ED and the median ED length of stay was 5.6 hours. In the next 30 days, 29.9% had recurrence of AAF or AAFL, 15.5% were electrically cardioverted, 16% were admitted to hospital, 0 had CVA, and 2.1% were lost to follow-up. **Conclusion:** Treatment with the OAP yielded a 91.4% conversion rate and 30-day follow-up found no incidence of CVA or cardioversion-related adverse events. The protocol appears to be safe, rapid, and highly effective for the ED management of AAF or AAFL. **Keywords:** acute atrial fibirillation, acute atrial flutter, Ottawa Aggressive Protocol

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NOVEL applications of a video laryngoscope (GlideScope Ranger) in primary, secondary, and tertiary aeromedical evacuation — a case series

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Introduction: Airway management in the prehospital setting remains a skill that poses frequent challenges to the operator. A portable video laryngoscope was trialed by the BC Provincial Air Ambulance Service (BCAAS). We describe the versatility of this device in the aeromedical setting beyond primary endotracheal intubation. **Methods:** The device assessed was the GlideScope Ranger (GR). The BCAAS provides primary, secondary, and tertiary aeromedical evacuation (AME) services for the province of British Columbia. Over a 7-week trial period, the GR was trialed at a single station, predominantly as part of a HEMS primary response service. This team responds to ~ 500 calls/year by rotary-wing, and ~ 800 calls/year by fixed-wing. All aircraft are staffed by 2 critical care flight paramedics. Training on the device consisted of didactic and practical sessions on a mannequin. After each use the flight paramedics would contact a team physician for debriefing and enter data into our standardized provincial airway database. **Results:** During the 7-week trial period, the GR was used 16 times: as a primary intubating technique in 10 patients; as a rescue device in 1 patient; on 3 different occasions it was used in-flight as an adjunct to trouble-shooting ventilator alarms; on 2 occasions, the availability of the GR factored into the flight crews decision not to intubate trauma patients in order to expedite transport to a trauma centre. **Conclusion:** Prehospital primary AME, along with secondary and tertiary critical care transport (CCT) is becoming available on an expanding basis. A portable video laryngoscope is a useful adjunct for prehospital airway management and CCT. We present a case series that propose novel applications for this device that may optimize prehospital scene times as well as the delivery of in-flight critical care during AME. Further studies are required to quantify the benefit of these applications. **Keywords:** video laryngoscopy, aeromedical evacuation, case series

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MANAGEMENT of cutaneous abscesses in the emergency department

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Introduction: Cutaneous abscesses (CAb) are a very common problem, accounting for 1.5% of all ED visits in the USA. This study assessed CAb patients with regards to treatment practices, documentation of risk for MRSA, and management of those found to have community acquired (CA) MRSA. **Methods:** We conducted a formal health records review for a 12-month period in a tertiary care ED. Research ethics approval was obtained. We included consecutive adult patients presenting to the ED with CAb and excluded those with perianal, genital and dental abscesses. We identified cases from the National Ambulatory Care Reporting Systems database, abstracted data onto a standardized data form, and entered into an electronic database. The primary outcome was management of CAb at index visit. The secondary outcome was identification of patients at risk for CA-MRSA and management of patients with risk factors for CA-MRSA CAb. We conducted descriptive analyses. **Results:** One-hundred seventy-four patients were used for analysis. Of 226 patients identified using ICD codes, 47 did not meet inclusion criteria and 5 charts were not found. Patients had a mean age of 42.0 (range 17–92) and 59.5% were male. Abscess locations were upper limb 35.1%, lower limb 27.9%, head 13.5%, trunk 19.0%. Initial management included incision and drainage 78.3%, packing 55.9%, antibiotics 72.0%, and swabs for culture 19.8%. Identified risk factors for CA-MRSA were intravenous drug use 41.7%, low socioeconomic status 20.8%, immunocompromised 38.9%, known MRSA 4.2%, skin disorders 29.2% and diabetes 19.4%. In patients with risk factors for CA-MRSA, culture was performed at 27.8% of visits and antibiotics were prescribed in 77.8% of visits. **Conclusion:** We found a lack of consistency with respect to management of CAb. Many patients were inappropriately treated with antibiotics and risk factors for CA-MRSA were frequently ignored. Future studies should address the optimal management strategies for CAb patients, especially those at high risk for CA-MRSA. **Keywords:** cutaneous abcesses, community acquired MRSA, health records review

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EMERGENCY medical care onboard the international space station: a literature review

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Introduction: Humans are advancing towards long duration missions in space. Timely crew return to a terrestrial health care centre may not be feasible. To mitigate the risks involved with spaceflight, a comprehensive emergency response framework must be developed that may be delivered on site or by remote guidance. The objective of this study was to perform a literature review to determine the quality of emergency medical care possible onboard the International Space Station. **Methods:** A review of databases (Medline, EMBASE, Cochrane, ACP, DARE, CCTR, CMR, HTA, and NHSEED) was performed until December 2008 searching for relevant studies. The search strategy included a combination of synonyms for MeSH terms "weightlessness," "space flight," and "emergencies." Papers were included if they described aspects of medical competency onboard the International Space Station. Related papers were sought from bibliographical references. Authors of relevant papers were contacted for further discussion. Personal communications with NASA flight surgeons were also included in this review. **Results:** Medical emergencies encountered on the International Space Station have included benign conditions such as space motion sickness as well as severe conditions such as cardiac ischemia requiring urgent crew return to Earth. Life threatening and mission threatening medical emergencies are uncommon, but may still occur. Currently, there is no consistently available crew return vehicle to allow a timely return of a sick crewmember to Earth. The dearth of preflight medical training, onboard medical resources, and full-time access to medical expertise limits the types of medical emergencies that may be treated in space. Medical autonomy is not feasible within current training and financial constraints. **Conclusion:** A variety of minor medical emergencies may be handled well on the International Space Station. However, the current level of medical care would not be adequate to ensure crew safety on longer duration missions beyond lower Earth orbit. **Keywords:** International Space Station, onboard emergencies, narrative review

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WHAT are average vital signs in a rural emergency department?

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Presenter status: Medical student

Objective: There is little descriptive data on vital signs values of patients entering the emergency department (ED). Often patients present to the ED with pain and anxiety which can raise the blood pressures, pulse and respiratory rate. It is well recognized that there are significant difference between urban and rural EDs. No information could be found quantifying the vital signs of patients presenting to a rural ED. The objective of this study was to determine the mean triage vital signs of patients presenting to a rural ED. In addition, to quantify how many patients had abnormal vital signs at triage. **Methods:** A retrospective chart review was conducted on patients that presented to the South Huron Hospital ED from September 1st to November 30th, 2008. Triage vital signs of heart rate (HR), respiration rate (RR), blood pressure (BP), oxygen saturation (O2-Sat), temperature (T), and pain. **Results:** A total of 2019 patients registered in the ED during the 3 months of the study. There were 1602 patients that met inclusion criteria (age > 18 years). The mean age was 50.7 years and 54% of the patients were males. Triage vital signs had the following means: HR 83 bpm, RR 18 bpm, systolic BP 134 mm Hg, diastolic BP 79 mm Hg, O2-sat 97%, T 36.50C and pain 5 out of 10. A total of 38% of patients had high blood pressure (systolic BP > 140 and/or diastolic BP > 90 mm Hg) with 7% having isolated systolic hypertension(systolic BP > 160 mmHg). Patients had tachycardia (HR > 100 bpm) 15% of the time and bradycardia (HR < 60 bpm) 5% of the time. Ten percent of patients had tachypnea (RR > 20). Only 2% of patients had a fever (> 37.8°C) and 0.4% were hypoxic (O2 sat < 90%). **Conclusion:** This study demonstrates the average vital signs values of adults presenting to a rural ED and many patients presented with abnormal vital signs at triage. **Keywords:** triage, vital signs, rural medicine

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FACTORS associated with shorter door-to-antibiotics time for patients with febrile neutropenia in the ED

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Introduction: Febrile neutropenia (FN) is an oncological emergency with high mortality which requires prompt antibiotic therapy. Emergency department processes, such as standing orders for blood tests at triage, may reduce delays. We evaluated whether having complete blood count (CBC) results available prior to first physician assessment was associated with shorter door-to-antibiotic (DTA) time. **Methods:** We reviewed electronic and chart data of all patients with a final in-patient diagnosis of FN admitted to a tertiary care centre in Toronto over 11 months in 2007. Demographic, clinical and process data were recorded from charts or electronic databases. DTA time was calculated from triage to delivery of drug. The main predictor was CBC result available before first seen by MD, covariates included age, sex, CBC drawn at triage, neutropenia on first CBC, abnormal vitals. **Results:** A total of 85 patients were sampled; 72 patients included in the study: 36% male, with a mean age of 58 ± 14. Most patients presented from home (96%) and all were given high acuity triage codes. Patients presented 9.8 days after chemotherapy on average. Although 50% of patients did not have CBC results available when first assessed by an ED physician, their mean DTA time was shorter than those who had a CBC results available (83 v. 224 min, $p < 0.05$). Ninety percent of patients had a final ED diagnosis of FN, 93% were treated with antibiotics in the ED. The overall mean DTA was 4.7 h (95% CI 3.9–5.5). In multivariate regression analysis, seeing a physician before CBC results available was associated with shorter DTA time (–146 min, $p = 0.0002$); weekend cases were associated with a longer DTA time (151 min, $p = 0.0023$); no other variable reached statistical significance. **Conclusion:** DTA time is a feasible measure of quality of care in patients with FN. Delays frequently occur, though most patients a eventually diagnosed and treated in ED. Our findings do not suggest that having a CBC result available at the first physician assessment reduces DTA time for FN. **Keywords:** door to antibiotic time, febrile neutropenia, quality improvement

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CHALLENGES and opportunities in establishing a provincial interprofessional collaborative for emergency practice improvement: understanding health professional perspectives

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Introduction: Optimizing emergency medicine management is an important yet challenging quality of care issue. Two approaches that could help achieve this goal are: the Community of Practice (CoP) model, to facilitate knowledge exchange among professionals, and the Institute of Healthcare Improvement (IHI) system redesign model, to foster common improvement outcomes. With the goal of harmonizing clinical and operational improvements in Emergency care, this study explored the opportunities and challenges of forming an interprofessional CoP to support the provincial implementation of the IHI model. **Methods:** A workshop was held in September 2007, involving emergency administrators, nurses, and physicians from across BC. The CoP and IHI Improvement models were introduced; participants discussed their potential for emergency care practice improvement. A preworkshop survey queried participant needs and motivations for engaging in the project. A postworkshop survey gathered feedback and strategies for future collaboration. **Results:** Twenty-five emergency department professionals participated in the workshop. Nine of the workshop participants were physicians, 10 were nurses and 6 were administrators. Participants' priorities centred on developing working relationships with colleagues and overcoming the rural–urban divide. Fifteen participants completed the postworkshop survey. They suggested the following approaches for the collaborative: focus on implementation; use a community driven agenda; collaborate interprofessionally; and become improvement advocates. Most indicated that webcast and videoconferencing would be effective in facilitating the CoP and that face-to-face workshops, email, and teleconferences would be effective in enhancing the level of communication. **Conclusion:** Combining a CoP and local collaboratives towards a province-wide emergency medicine practice improvement strategy received strong interprofessional support. Invaluable strategies for successful implementation were also identified. **Keywords:** interprofessional education, community of practice, qualitative research

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CAN triage level predict death in the emergency department?

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Introduction: Triage in the emergency department (ED) is designed to assess patients in order to assign them a priority which determines within which time frame they can safely be evaluated by an emergency physician (EP). We aimed at measuring in which proportion patients dying in the ED are triaged at a high level of priority using the Canadian Triage and Acuity Scale (CTAS). **Methods:** We retrospectively extracted from our ED software patients who had

died while in the ED in the last 5 years. We then checked which triage level they had been assigned at arrival. Patients whose death was waited for as those in palliative care were excluded. We considered patients who died in the ED and who were scored on CTAS as 1 or 2 (resuscitation or emergent) as having been categorized adequately. We then measured the proportion of patients having died who received a high triage score. **Results:** Seventy-one patients died in our ED within the last 5 years. Fifty-three patients were scored at levels 1 or 2 on CTAS while 18 were scored at levels 3 or 4. The triage level assigned to patients who died while in the ED was deemed adequate only 75% of the time. **Conclusion:** In our ED, over a 5-year span of clinical activity, CTAS score of 1 and 2 were not sensitive as a mean of predicting death in the ED. **Keywords:** triage, mortality prediction, CTAS

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PREDICTORS of unscheduled return visits to the emergency department

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Introduction: Patients making unscheduled return visits to the emergency department (ED) within 72 hours may do so because of inadequate assessment or treatment during their index visit, incorrect diagnosis, patient–physician communication gaps, deterioration after discharge, or a lack of outpatient follow up. Many unscheduled return visits are unavoidable despite competent care; however, this cohort may present higher clinical and medico–legal risk. Published data describing these patients are limited, and analysis of return visits will help uncover potential deficiencies in patient care, both in the ED and community. Our objective is to identify predictors of unscheduled return visits to the ED within 72 hours at 3 Canadian urban adult hospitals. **Methods:** Calgary's 3 urban adult emergency departments treat 210 000 patients per year, and approximately 3.6% make return visits within 72 hours. This case–control study will identify predictors associated with unscheduled return visits. The Regional ED Information System will be used to identify all patients discharged from the ED who required a 72-hour revisit during the 1-year study period (cases). Patients returning for scheduled reassessment, treatment (e.g., IV antibiotics), or consultation will be excluded. Controls (patients discharged during the study period who did not have revisits) will be matched in a 2:1 ratio and candidate predictors will be gathered from our electronic database. **Results:** The analysis will determine which patient variables (age, gender, socioeconomic status, presenting complaint, triage acuity) and system variables (hospital site, wait time, services consulted, and presence of a general practitioner) are most highly associated with ED return visits. A secondary analysis will address the subset of patients who require hospitalization within 72 hours. **Conclusion:** Better understanding of unscheduled ED revisits will provide insight into vulnerable patient populations, and potential deficiencies in care in both the ED and community. **Keywords:** unscheduled ED revisits, case–control study, administrative database

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ETHANOL and illicit drug screening in the emergency department of a major trauma centre

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Introduction: Automatic ethanol and illicit drug screening of trauma patients is not standard practice in Canadian emergency departments. Incidence of screening and prevalence of substances of abuse in trauma patients varies among institutions. Trauma patients under the influence of ethanol or illicit drugs may require different management strategies. This study explores the rate of screening and prevalence of ethanol and illicit drug use in trauma patients presenting to a major trauma centre emergency department. **Methods:** A single centre cross sectional design and retrospective chart review of all patients in the emergency department where the trauma team was activated or consulted between September and November 2007.Data collected included the presence or absence of urine drug screen and/or blood ethanol result. Other demographic data included age, gender and mechanism of injury. **Results:** Of the 343 charts that met the criteria for inclusion, there 298 ethanol screens (86%) with 120 positives (35%). One-hundred fifty patients (44%) were involved in motor vehicle accidents with ethanol testing positive in 43 (29%). Urine drug screens were conducted in 85 patients with 34 testing positive. Benzodiazepines and tetrahydrocannabinol were the most common positive results. **Conclusion:** This study confirms that the majority of trauma patients at this centre are screened for ethanol with 34% of patients testing positive. Urine drug screening is done far less frequently but with a considerable number of positives in those screened. Further research needs to be done to explore the prevalence of illicit drug use in trauma patients and implications for management. **Keywords:** screening, substance abuse, health records review

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CAN emergency physicians reach a consensus on criteria to transport an elderly person by EMS?

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Introduction: According to the literature, between 35% and 68% of EMS transports for senior citizens are unnecessary. However, few studies have tried to define criteria identifying those unnecessary transports, none specifically for this population. Our study aimed at determining if emergency physicians (EP) could reach a consensus on criteria defining an unecessary EMS transport. **Methods:** A retrospective study design was used with data from 79 patients selected from a previous study. Those patients were transported by EMS to our academic urban emergency department (ED) which has a census of 55 000 visits and none of them were hospitalized. Three EP analyzed their charts to identify and extract items that could potentially predict unnecessary EMS transport. A questionnaire was drafted with those items to assess if EP thought those predicted unnecessary EMS transports. The questionnaire was tested with 3 different EP to assess the clarity of the questions and the format. The final version of the questionnaire evaluated 55 items. **Results:** All nineteen eligible EP from our ED participated in the study and answered the questionnaire. EP agreed on 3 symptoms predicting unnecessary EMS transport: loss of appetite (94.7%), constipation (89.5%) and chronic light pain (82.2%). For pain as a symptom, the results showed that only light pain lasting for more than 24 hours was not considered as justifying EMS transport. Finally, among respondents, no consensus could be reached on specific drugs linked to symptoms as a mean to identify unnecessary transports. **Conclusion:** Our study shows that, for the participating group of EP, a set of specific symptoms could consensually predict unnecessary EMS transports. Thus, it appears possible to establish criteria to help decide to transport by EMS or not patients older than 65. **Keywords:** prehospital transport, geriatrics, survey research

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THE EXTENT of overcrowding in Saudi Arabia: prevalence and severity

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Introduction: Emergency department (ED) is a vital component in our health care safety net, available 24 hours a day, and 7 days a

week, for all who require care. There has been a notice growth in the volume and acuity of patient visits to ED and over the past 2 decades, there has been increasing concern about this dramatic growth in ED visits. More recently, emergency physicians responsible for the management of ED in Saudi Arabia have been raising their concern regarding the capacity of their ED services. Their concern has been driven by an increasingly familiar phenomenon "overcrowding" of ED that has worsened to the point of crisis worldwide. **Objective:** To survey the directors of ED in Riyadh, Saudi Arabia on their opinion of the extent and factors associated with ED overcrowding. **Methods:** The surveys were mailed to a 10 ED directors in the Riyadh. The survey was designed to rate the relevance of 23-measures by analyzing the patient journey while in ED (input-throughput-output) and to rank their severity as a cause of ED overcrowding. **Results:** The response rate was 100%. Seventy percent of ED sees more than 100 000 patients annually. Fifty percent of the directors reported overcrowding as a problem always happening in their department and 40% reported it as an often problem. The most important causes of overcrowding identified and ranked by the directors to be a severe cause were delays in discharging inpatients (90%), lack of admitting inpatient bed (70%), length of stay of admitted patients in ED (70%), increase the volume of ED patients (60%), and delay in disposition plan while the patient in ED (60%). **Conclusion:** Overcrowding is serious problem nationally and very commonly seen in ED. Overcrowding is not limited to ED rather it is perceived by ED director to be hospital wide problem. Leaders should reinforce further polices at a higher level to prevent upcoming overcrowding sequel. **Keywords:** ED crowding, Saudi Arabia, survey research

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INVESTIGATIONS ordered for patients with suspected renal colic/urolithiasis

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Introduction: Urolithiasis is a common emergency department (ED) diagnosis. When clinical findings and past medical history are inconclusive, diagnostic imaging may be used to confirm the diagnosis. Compared to ultrasound (US), computed tomography (CT) has a higher sensitivity for calculus detection, however US requires no ionizing radiation. The objective of this study was to determine the investigations routinely ordered by emergency physicians for patients with suspected urolithiasis. **Methods:** The investigation and treatment approach to first-time and repeat presentations of renal colic was examined using a 32-item survey distributed to all physicians and residents working in the EDs of the London Health Sciences Centre (academic centre with a combined annual census of 150 000) between October and December 2008. **Results:** 52/61 questionnaires were completed, providing a response rate of 85.2%. Nineteen (36.5%) respondents were residents and 33 (63.5%) respondents were staff physicians. There was no difference detected in the ordering patterns between residents and staff physicians ($p > 0.05$). For first-time presentation of renal colic, all respondents indicated that they would order some type of imaging. Forty-six (88.5%) respondents would order a renal US, and 6 (11.5%) respondents would order a CT. For a patient with a previous history of urolithiasis, 26 (50%) respondents would order an US, 4 (7.7%) would order a KUB, 3 (5.8%) would order a CT and 19 (36.5%) respondents would not order any imaging. 45 respondents (86.5%) indicated that age would play a role in their investigation choice, with 36/45 (80.0%) citing radiation exposure as a factor. Only 28 (53.8%) respondents routinely prescribe expulsive therapy to patients with stones. **Conclusion:** Despite its decreased sensitivity for stone detection as compared to CT, renal US is more commonly used as both an initial and repeat investigation for renal colic. Physicians indicated that a major factor in choosing US over CT is patient age and radiation exposure. **Keywords:** renal colic, diagnostic imaging, survey research

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DISCHARGING satisfied patients from an emergency department

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Introduction: Discharging patients from the emergency department (ED) is a critical part of the encounter. Recent research has shown 4.5% of patients return to our ED within 7 days for the same problem. This is referred to in the medical literature as "bounce backs." The literature suggests failure to explain the diagnosis, prognosis and appropriate follow-up contribute to this phenomenon. To try and decrease the bounce back rate a new discharge protocol was implemented at South Huron Hospital. The objective of this study was to determine the level of patient satisfaction with a new discharge protocol. **Methods:** A 10-question survey tool was created with help from nursing, administrative and medical staff. The questions were based on the existing National Research Corporation Picker questionnaire used to evaluate patients' ED satisfaction. Patients were surveyed on 2 weekdays and 2 weekend shifts over a 2-week period. Patients' understanding of their diagnosis, treatment and follow up as well as general patient satisfaction was evaluated. **Results:** Of the 65 eligible patients, 55 (85%) completed the survey. Patients reported being told what their diagnosis and treatment was 98.1% of the time. Most patients said they were told what warning signs to look for (90%) and where they should follow up after the ED visit (94.3%). Overall patients positively rated the explanation of what was done 96.4% of the time. They rated the overall care positively 98.2% of the time. Courtesy and team work were between doctors and nurses was positively rated 100% of the time. If they or a loved one became sick they would recommend our ED 98.2% of the time. **Conclusion:** Patient satisfaction is very high after implementing a new discharge protocol at South Huron Hospital. Further research is being conducted to see if the new process will decrease the rate of bounce backs. **Keywords:** patient satisfaction, ED discharge, survey research

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A STRUCTURED, computer-order algorithm for emergency department chest pain patients reduces missed diagnoses of acute coronary syndrome and decreases admission rate

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Introduction: Many emergency departments (ED) utilize unstructured, individualized approaches to patients with chest pain. Estimates of the rate of missed diagnoses of acute coronary syndrome (ACS) range from 2% to 5%. We sought to reduce this rate by developing an algorithm that would provide a structured approach in managing chest pain patients. **Methods:** A formalized ED chest pain evaluation process was developed and provided to emergency physicians (EP). The elements were encouraged but not mandatory and included computer-order entry that prompted EKGs and cardiac biomarkers on ED arrival and 6 hours later and facilitated scheduling of outpatient stress EKGs or radionuclide scans within 48 hours for patients with no objective ischemia. Patients felt to be at clinical risk or those with positive tests were referred to cardiology. At the EPs discretion, very low-risk patients could be discharged before 6 hours. A single-centre cohort of chest pain patients enrolled in 2006 was compared with a historical unstructured cohort from the same site from June 2000 to April 2001. The primary outcome was the rate of

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missed diagnosis of ACS at 30 days, defined as discharge from the ED with a non-ACS diagnosis but a subsequent ACS event within 30 days. **Results:** Both groups were similar in age, gender, and vital signs. ACS prevalence was 21.2% (398/1819) in the historic and 11.1% (124/1117) in the intervention cohort. The 30-day missed ACS rate fell from 5.3% (21/398) to 0% (0/124). The admission rate for patients with no ACS decreased from 18.3% to 6.7%, and similar proportions (21.2% v. 19.8%) of patients were discharged from the ED within 3 hours. Five patients died in each group, and the rates of coronary interventions were 11.7% and 6.8%, respectively. **Conclusion:** In a cohort of ED patients with undifferentiated chest pain, the intervention protocol resulted a reduction in the 30-day missed ACS rate, while decreasing admissions. **Keywords:** acute coronary syndromes, computerized physician order entry, diagnostic error

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EMERGENCY physician diagnosis and management of small traumatic pneumothorax: results of a national survey

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Introduction: Small to moderate-sized traumatic pneumothoraces (PTX) and hemopneumothoraces (HTX) in stable patients present a dilemma to clinicians owing to the lack of consensus or guidelines. This study examined the diagnostic and therapeutic modalities utilized by Canadian emergency physicians (EP). **Methods:** A pilot survey was tested on emergency medicine residents (n = 15). Utilizing a modified Dillman method, a self-administered survey was electronically mailed in November 2008 to 1500 members of the Canadian Association of Emergency Physicians (CAEP), in accordance with CAEP guidelines. Respondents were asked to provide information on demographics (level of training, years of experience, number of PTX encountered annually, and location of practice — rural/community or urban). Six clinical vignettes relating to various types of isolated PTX and HTX in stable trauma patients were presented. (20% blunt PTX and HTX, 20% penetrating PTX and HTX, occult PTX, and prehospital-drained PTX [needle PTX].) **Results:** 504 (33.6%) physicians responded: 63.7% of respondents practiced in teaching hospitals and 36.7% in community/rural settings. 11.1% were residents, 35.7% had less than 5 years experience, and 39.4% encountered more than 5 PTX annually. 67.4% of physicians would observe a patient with blunt PTX, while 32.6% would provide drainage; for blunt HTX, 36.5% would observe. Only 18.9% and 8.5%, respectively, would observe a patient with penetrating PTX and HTX. 93.5% of EPs would observe an occult PTX, while 56.1% would observe a prehospital-drained PTX. These results were consistent across all demographics regardless of level of training, experience, or location of practice. (one way ANOVA, $p > 0.05$ for each vignette). **Conclusion:** In the absence of any evidence-based guidelines, Canadian EPs have adopted a discrepant approach to managing most of the types of small traumatic PTX / HTX in stable trauma patients. Treatment appears to be more homogeneous only for penetrating HTX and occult PTX. **Keywords:** pneumothorax management, survey research, practice variation

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DRUGS on the farm: top 10 medications used in a rural emergency department

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Introduction: It is well recognized that there are differences between rural emergency departments (EDs) and urban EDs. Very limited information is available about the most frequent medications that are used in an ED. A literature search showed no information about the most common medications used in a rural ED. The purpose of this study was to identify and quantify the 10 most frequent medications used in a rural ED and correlate it to the 10 most frequent diagnoses. **Methods:** A data base search of the Automated Dispensing Cabinet was preformed at South Huron Hospital from July 1, 2008 to October 31, 2008. A report was also generated from AMCARE10 database on the most responsible diagnosis from the same time period. In addition, basic demographic information was obtained including CTAS scores and the length of stay (LOS) in the ED. **Results:** There were 3536 visits in the ED from July 1, 2008 to October 31, 2008. The mean age was 43.8 years, the mean CTAS score was 3.9 and the mean LOS was 121 minutes. The top 10 medications used were; Ketorolac 30 mg/mL Inj., Dimenhydrinate 50 mg/mL Inj., Acetaminophen 500 mg, Tetanus 0.5 mL inj., Morphine 10 mg/mL Inj., Ibuprofen 200 mg, Indermil Tissue Adhesive/ Skin Glue, Salbutamol nebules 5 mg/2.5 mL, Acetaminophen/Codeine 300/30 mg, and Acetaminophen/Oxycocet 325/5 mg. The top 10 diagnoses were; open wound of finger, urinary tract infection, abdominal pain, acute upper respiratory infection, chest pain, open wounds head, foreign body eye, asthma, open wound of wrist and hand, and sprain ankle. **Conclusion:** The top 10 medications used in a Rural ED fall into a few main categories of medicine to treat pain (NSAID's, analgesic, narcotics), nausea, lacerations, and breathing problems. This data correlated well to the top 10 diagnosis of painful conditions, open wounds and respiratory problems. **Keywords:** rural medicine, medication utilization, ED pharmacy database

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IMAGING modalities used in the diagnosis of diverticulitis in the adult emergency department

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Introduction: Diverticulitis is common emergency department (ED) diagnosis. It is important to diagnose and treat diverticulitis promptly to avoid serious complications such as bowel perforation or obstruction; both of which require urgent surgical intervention. The objective of this study was to review the utilization of imaging modalities and antibiotics in the management of diverticulitis. **Methods:** A retrospective medical record review was completed for all adult (> 17 years) patients with an ED diagnosis of diverticulitis. Data was gathered by a trained abstractor from an academic tertiary care ED (annual volume 65 000) over a 1-year period (April 1, 2007 to March 31, 2008). Frequencies were calculated using Excel and proportions were compared using Pearson χ^2 statistic. **Results:** Of 118 patient visits with a diagnosis of diverticulitis, 65 (55.1%) were male. 75 (62.7%) patients had a computed tomography (CT) scan, 4 (3.4%) had an ultrasound, 5 (5.1%) had both and 34 (28.8%) were managed without imaging. Patients with no previous history of diverticular disease were more likely to have a CT (64.9 v. 35.1%; $p < 0.05$). 70 (59.3%) patients were treated with antibiotics in the ED. There were more unplanned return visits to the ED for patients not treated with antibiotics (11/48; 23%) compared to those treated with antibiotics (5/70; 7%) in the ED ($p = 0.014$). Patients were more likely ($p < 0.05$) to be admitted to hospital if they had an elevated white blood cell (WBC) count or triage temperature. There was no difference found in admission rates between patients with known diverticular disease and those without a previous history. **Conclusion:** The majority of patients (71.2%) diagnosed with diverticulitis had imaging in the ED. Early antibiotic treatment reduced the number of subsequent ED visits within 7 days of diagnosis. Patients were more likely to be admitted if they had an elevated triage temperature or WBC count, suggesting that these parameters may be an important indicator of disease severity. **Keywords:** diverticulitis, diagnostic imaging, CT scan

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CLINICAL audit of recognition of and response to acute illness in adults admitted to hospital from the emergency department in accordance to NICE (National Institute for Health & Clinical Excellence) Clinical Guideline 50 (July 2008)

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Objective: The NICE (National Institute for Health & Clinical Excellence) Clinical Guideline titled: "Acutely ill patients in hospital: recognition of and response to acute illness in adults in hospital" recommends that patients in the emergency department for whom a clinical decision to admit has been made, should have: a) as a minimum, the following physiological observations recorded at the initial assessment and as part of routine monitoring: heart rate, respiratory rate, systolic blood pressure, level of consciousness, oxygen saturation and temperature; b) the frequency of monitoring should increase if abnormal physiology is detected. **Methods:** Retrospective analysis of medical records of all adult patients who attended our emergency department between July 1 and October 1, 2008 and were subsequently admitted to the hospital. **Results:** 804 patients were included in this audit. With the exception of 8 patients' records (less than 1%), all medical records had at least one parameter of observations recorded. Fifty-three point nine percent of them (434 records) were complete according to the Guideline's recommendation, 362 (45%) were lacking one or more parameter. Respiratory rate was the least frequently recorded observation (391 records), closely followed by the level of consciousness (403 records). Seven-hundred seven patients in the study population had abnormal observations; the frequency of observations was appropriately increased in 603 of these patients. **Conclusion:** Doctors and nurses in the emergency department should be educated on the importance of abnormal physiological observations in the early recognition of acutely unwell patients and hence in patient safety and about the fact that this NICE Guideline outlines the minimum observations recommended which should be observed at all times and not regarded as an exhaustive list. The audit will be repeated to determine if any change to current practice has been instigated. **Keywords:** audit, NICE Clinical Practice Guideline, medical records review

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WHAT are the indicators of potential for rupture for ectopics seen in the emergency department?

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Purpose: The purpose of this study was to determine if it is possible to determine which emergency department patients with ectopic pregnancy are at risk for rupture. **Methods:** This is a retrospective chart review of all women aged ≥ 18 years over a 5-year period who presented with ectopic pregnancy to a level 1 ED. Data was collected using a data collection sheet that included: basic demographic information, history of the patient, including medical, surgical, obstetric and gynecologic history, social and sexual history, findings on physical examination, and lab values such as urine pregnancy test, beta-hCG values and complete blood count. **Results:** Out of 187 ectopic pregnancies with complete data, 122 ruptured and 65 did not. Of the total, 30% had a Beta < 1500 and 65% had a Beta > 1500. There was a significant difference F = 17.798, $df = 1$, $p = 0.001$ between those with a Beta of 1500 or less and those equal to or greater than 1500 only in relationship to those patients who ruptured. A Beta of less than 1500, 41% ruptured, 21% did not and 34% were not diagnosed with ectopic at the ED. Out of those with a Beta equal to or more than 1500, 57% ruptured, 28% did not and 10% were not diagnosed with ectopic during the ED visit to ruptures. For those who received treatment 63% had surgery, 4.2% received medical treatments, 6.3% were directed to return for follow-up and 2.1% received surgery .Using a general linear regression model to see what variables indicate the potential for rupture similar variables were significant with overall power of 79%. Prior tubular ligation $p = 0.01$, vaginal bleeding $p = 0.01$, nausea $p = 0.04$, systolic $p = 0.04$, beta HCG $p = 0.03$ were significant indicators of potential to rupture with a beta of 1500 or less variable having a R^2 of 67%. **Conclusion:** Few variables were able to differentiate ectopic pregnant women with or without rupture. Beta-HCG was the most dominant variable in explaining the model's variation between those who will or will not go on to rupture. **Keywords:** ectopic pregnancy, rupture, risk factors, health records review

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ASTHMA bouncebacks at 2 urban Canadian emergency room departments

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Introduction: According to current Canadian guidelines, assessment of clinical relapse risk is an important adjunct to spirometric test results to guide disposition of patients with asthma in the emergency department (ED). **Methods:** Two researchers reviewed 316 charts of patients ages 18 to 39 treated between April 2006 and March 2007, with a diagnosis of asthma at 2 urban Canadian EDs. Variables were extracted from 257 eligible charts, including patient demographics, number of asthma medications taken at home, previous ED or hospital admission, recent corticosteroid use, previous intubation, investigations and medications used during the initial visit, disposition, length of stay, prescriptions on discharge, referral, CTAS level and CAEP asthma severity scale. A forward stepwise binary logistic regression procedure was used to determine the best fitting model for predicting a repeat visit to the ED within 14 days. **Results:** Only 2 significant ($p < 0.05$) variables were found to be significantly related to ED readmission in the final model. Number of asthma medications taken at home was associated with increased probability of readmission (OR 1.92, 95% CI 1.08–3.41), as did an initial ER visit during the winter months (OR 10.35 95% CI 2.01–53.19). **Conclusion:** Patients who have several home asthma medications likely represent those with more severe disease and are at higher risk of relapse. The higher relapse risk associated with winter visits complements prior findings of increased asthma admission rates during this season. These risk factors should be considered during disposition of ED asthma patients. **Keywords:** asthma, asthma relapse, risk factors

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DESIGN and implementation of an emergency medicine research associates program

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Introduction: The emergency department is a desirable clinical arena to conduct research. However, the ability of emergency nurses and physicians to identify and enroll potential research participants is difficult as patient care and departmental flow take priority. To improve research productivity in Calgary's emergency departments, we designed the Emergency Medicine Research Associates Program. **Methods:** The program will recruit volunteer students in medical, nursing, or allied health programs from accredited postsecondary institutions in Calgary, Alberta. These students will be research associates and they will be responsible for identifying potential research participants for studies involving emergency department patients. In addition, research associates will receive

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biweekly lectures on research methodology and clinical emergency medicine during their 13-week participation in the program. Prior to implementing the program, representatives from Calgary Health Research, Legal Services, the Conjoint Health Research Ethics Board, the Alberta Privacy Commissioner's Office, and the Regional Department of Emergency Medicine were consulted to ensure all legal, ethical, and privacy issues of the program design were addressed. The program will first be implemented at the Foothills Medical Centre and expanded to all Calgary emergency departments over the following year. **Results:** The design of the program was approved by all representatives in 2008. The first group of research associates will begin in the spring of 2009. **Conclusion:** We have successfully designed and implemented an Emergency Medicine Research Associates Program. It is expected that this program will increase research productivity in Calgary's Emergency Departments as well as improve collaborative research efforts with other clinical departments. **Keywords:** EM Research Associates Program, health care students, clinical research

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THE EMERGENCY Coma Scale as a predictive tool of patient-outcomes with neurological emergency settings

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Introduction: The Emergency Coma Scale (ECS) was established in Japan to evaluate the consciousness levels of patients in neurological emergency settings. In the previous study, we proved the validity of the ECS. Our present purpose was to evaluate correlation between the scores of various coma scales, including the ECS, the Glasgow Coma Scale (GCS) and the Japan Coma Scale (JCS), and patient outcomes. **Methods:** Ten Japanese medical facilities including 4 university hospitals were enrolled in this study. The raters evaluated the consciousness level of patients by 3 coma scales at transportation, and determined the Glasgow Outcome Scale (GOS) score at the time of discharge. We performed logistic regression analyses to evaluate the relationships between outcome and each coma scale score. Data were analyzed using the statistical software program Dr. SPSS II for Windows (SPSS, Inc.). **Results:** The ECS score appears to be more strongly related to the GOS than those of the other 2 coma scales in all raters. Similar results were obtained in patients with cerebrovascular disease (CVD) or traumatic brain injury (TBI). In addition, 3 major category-structure of the ECS only according to the levels of awakening showed strongest correlation among 3 scales. **Conclusion:** The 3 major categories of the ECS predicted patient outcomes with sufficient accuracy. In other words, the levels of awakening at the transportation may determine the patient-outcome to a certain degree. The 3 major category-structure of the ECS, as a tool for predicting the outcomes of patients, might be suitable for clinical application, even if the 9 detailed subcategories of ECS are not used. **Keywords:** emergency coma scale, traumatic brain injury, clinical prediction tool

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DOES online x-ray education help trainees in the pediatric ED?

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Introduction: Since there is no standard x-ray interpretation curriculum in the pediatric ED, there may be a role for Web-based instruction, which is visual, interactive, accessible and can be monitored. This would allow x-rays to be studied in the same medium that they are used clinically, although it is unclear if Web is better than text-based instruction, which can be used anytime and anywhere. The objectives of this study are to understand advantages and disadvantages of, and differences between, Web- versus text-based instruction, and develop an educational tool that augments trainee education in pediatric ED x-ray interpretation. **Methods:** A pediatric ED x-ray curriculum was developed, with images and teaching scripts stored on a secure divisional website. A survey-based qualitative tool was developed based on dominant themes arising from a moderated focus group exploring 8 residents' perspectives on x-ray learning. **Results:** Participants appreciate learning resources that are easy to use, result in minimal stress and are case-based and interactive. The residents enjoy education that is practical and relevant, with repeated examples, in a brief and focused manner. Self-assessment exercises and Web-based references are also appreciated. **Conclusion:** Residents have specific needs and recognize barriers to learning in an online medium. A multiple choice quantitative tool will be developed and piloted. Participants will be randomized to Web, text or no instruction during their pediatric ED rotations, and differences in their performance on the 2 evaluation tools will be compared. Data from these upcoming study phases will highlight pros and cons of Web-based pediatric ED x-ray interpretation curricula. **Keywords:** online education, radiology skills, qualitative research