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Oral presentations

1

TEST characteristics of ultrasonography for the detection of pneumothorax: a systematic review and meta-analysis

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Introduction: We sought to determine the test characteristics of ultrasound (US) in adult patients clinically suspected of having a pneumothorax (PTX), and how it compares to chest x-ray (CXR) using CT scan or release of air on chest tube placement as the gold standard. **Methods:** For this systematic review and meta-analysis, we searched MEDLINE, Embase and reviewed the reference list of the included articles and recent reviews. Two independent investigators used standardized forms to review papers for inclusion, quality (QUADAS tool) and data extraction. We included English language prospective studies comparing US to CT scan or release of air on chest tube placement in adult patients suspected to have PTX. We calculated κ interobserver agreement for study selection and evaluated clinical and quality homogeneity before meta-analysis of data. **Results:** Our search strategy identified 570 papers, 21 were selected for full review (κ = 0.89) and 8 papers met all including criteria (κ = 0.81). CXR data was available for 864/1048 patients evaluated with US. US was performed by emergency physicians (EPs) in 4/8 papers (606/1048 patients). PTX was traumatic in 767/1048 patients and iatrogenic in 281/1048 patients. All but 1 study used a combination of lung sliding and comet tail signs for the detection of PTX. Among 1048 patients, US was 90.9% sens (95% CI 0.87–0.94), 98.2% spec (95% CI 0.97–0.99), with 94.4% PPV and 97.0% NPV. CXR was 53.9% sens (95% CI 0.47–0.61), 97.1% spec (95% CI 0.96–0.98), with 85.2% PPV and 87.2% NPV. EPs were 95.3% sens (95% CI 0.90–0.98), 99.0% spec (95% CI 0.97–1.00), with 97.0% PPV and 98.5% NPV. Among 767 trauma patients, US was 90.2% sens (95% CI 0.85–0.94), 98.8% spec (95% CI 0.97–1.00), with 95.9% PPV and 97.0% NPV. **Conclusion:** The performance of US for the detection of PTX is excellent and is better than CXR. Considering the rapid access to bedside US and the excellent performance of this simple test, this study supports the routine use of US for the detection of PTX. **Keywords:** emergency ultrasound, pneumothorax, systematic review

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THE EFFECT of a bolus dose of etomidate on cortisol levels, mortality, and health care services utilization: a systematic review

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Introduction: Etomidate is a widely used induction agent for rapid sequence intubation (RSI). Our objective was to synthesize the evidence on the effect of a bolus dose of etomidate on adrenal function, mortality and health services utilization compared with other induction agents. **Methods:** We developed a systematic search strategy and applied it to 10 electronic bibliographic databases. We hand searched medical journals, conference proceedings, grey literature, bibliographies of relevant literature, and contacted content experts for studies comparing a bolus dose of etomidate with other induction agents. Studies reported in English, French and German were included if they reported adult data comparing the effect of a bolus dose of etomidate to another rapidly acting intravenous induction agent. Retrieved articles were reviewed and data was abstracted in duplicate using standardized forms. Data was pooled using the random effects model if at least 4 clinically homogenous studies of the same design reported the same outcome measure. **Results:** Of the 3083 articles found, 20 met our inclusion criteria. Pooled mean cortisol levels were lower in patients induced with etomidate compared with those induced with other agents between hours 1 and 4 post-induction. The differences varied from 6.1 µg/dL (95% CI 2.4–9.9 µg/dL, $p = 0.001$) to 16.4 µg/dL (95% CI 9.7–23.1 µg/dL, $p < 0.001$).

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No difference was observed after 4 hours. None of the studies reviewed, nor our pooled estimate (odds ratio 1.14, 95% CI 0.81–1.60) showed a statistically significant effect on mortality. Only one study reported longer ventilator, intensive care unit (ICU) and hospital lengths of stay (LOS) in patients intubated with etomidate, the other studies reported no difference. **Conclusion:** The available evidence suggests that etomidate suppresses adrenal function transiently without demonstrating a significant effect on mortality. However, no studies to date have been powered to detect a difference in hospital, ventilator or ICU LOS, or in mortality. **Keywords:** etomidate, adrenal function, systematic review

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ST. Michael's Hospital Basic Life Support Termination of Resuscitation Guideline Implementation Trial (TORIT)

Morrison LJ, Eby D, D'Souza P, Zhan C, Kiss A, Welsford M, Loreto C, Arcieri V, Prowd C, Pilkington M, Dodd T, Scott J, Mooney E, Reichl R, Verdon J, Waite T, Verbeek PR; St. Michael's Hospital, Toronto, ON

Introduction: This implementation study was designed to evaluate the transport rate of out-of-hospital cardiac arrest (OHCA) patients when the universal termination of resuscitation (TOR) guideline was applied in 8 services. TOR is recommended for arrests not witnessed by EMS, when there is no return of spontaneous circulation, and no shocks delivered. Secondary aims were to report errors in guideline application and comfort in application. **Methods:** This prospective multicentre observational trial was conducted from January 2006 to September 2008 across Ontario. Adult OHCA patients of presumed cardiac etiology treated by defibrillator only trained paramedics were eligible. Providers contacted the delegating physician when termination was recommended. Both provider and physician completed a data collection form indicating their comfort on a 5-point Likert scale. **Results:** Of 2421 OHCA and 953 patients were eligible for TOR guideline application. The TOR guideline was followed in 755 cases resulting in 388 terminations and 367 transports. There were no errors in guideline application. In 198 cases where the TOR guideline was not followed, paramedics cited 241 reasons: family distress (56), short time intervals (54), patient age (13) and public venue (10) accounted for 55%. Paramedics cited discomfort 28 times (11%). In 14 cases they were unable to establish telephone contact and in 30 cases the guideline recommended termination and the physician chose to transport (12.4%). All these 198 TOR eligible patients died in hospital. When the TOR guideline was applied the transport rate was 48.6%, which is significantly different than the previously reported transport rate of 100% when the TOR guideline was not applied ($p < 0.001$). Both providers and physicians were very comfortable (median [IQR] of 5 [4–5]; $p < 0.001$). **Conclusion:** The transport rate is significantly reduced when the TOR guidelines are followed, error rates are minimal and most providers were comfortable with following the guideline recommendations. **Keywords:** termination of resuscitation, implementation research, prehospital, cardiac arrest

4

THE IMPACT of a triage nurse ordering on ED overcrowding: a systematic review

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Introduction: Emergency department (ED) overcrowding is a crisis for many urban and high-acuity hospitals and effective interventions are urgently needed. The role of triage nurse order (TNO) sets has been proposed as a method to reduce ED delays. The aim of this study was to evaluate the evidence for TNO and its influence on ED overcrowding. **Methods:** Electronic databases (Cochrane Central Register of Controlled Trials, MEDLINE, Embase, Web of Science, HealthSTAR, Dissertation Abstracts, ABI/INFORM Global), controlled trial registry websites, conference proceedings, study references, experts in the field and correspondence with authors were used to identify potentially relevant TNO studies. Interventional studies in which TNO was used to influence ED overcrowding metrics (length of stay [LOS], left without being seen) were included in the review. Two reviewers independently assessed the citation relevance inclusion and study quality. Weighted mean differences (WMD) were calculated and reported with corresponding 95% confidence intervals (CIs). **Results:** From 14 716 potential relevant studies, 6 were included in the systematic review. All studies were described as trials, 5 were journal publications and 1 was a thesis. The trials were completed in various locations; all but one were single-centred ED studies. All studies were rated as weak due to poorly reported methods. ED LOS was reduced by 19.4 minutes (95% CI 15.7–23.1) for patients with fracture/injury status; however, no improvement was shown for patients without an injury/fracture (WMD 0.78 min; 95% CI 5.22–6.78); there was considerable heterogeneity (I^2 = 88%). **Conclusion:** Overall, triage nurse ordering appears to be an effective intervention to reduce ED LOS for injury/rule-out fracture cases. Medical management of patients using TNO approaches did not seem to reduce LOS. Nurses are capable of employing this strategy; one option would be to limit TNOs to injury cases. **Keywords:** emergency crowding, systemic review, triage nurse order

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PROSPECTIVE evaluation of the ABCD and ABCD2 scores in a Canadian ED setting

Hall C, Oczkowski W; Calgary Health Region, Calgary, AB

Introduction: The ABCD and ABCD2 scores were derived to predict stroke risk after TIA. Subsequent prospective validations have demonstrated lukewarm results. We sought to prospectively evaluate these scores in a Canadian ED setting. **Methods:** Prospective cohort study of all suspected TIAs referred from the ED for outpatient follow-up at the Hamilton Health Sciences Stroke Prevention Clinic (SPC) from Nov. 1, 2006, to Oct. 31, 2007. ED physicians completed a referral form including all elements of the ABCD2 score. Patients were then evaluated in the clinic by stroke neurologists. The primary outcome of interest was completed stroke at 7 days, with a secondary outcome of completed stroke at 30 days. **Results:** Of the patients, 285 attended the SPC for an outpatient appointment after being referred from the ED; 238 (83.5%) of these consented and were enrolled in the study; 113 (47.5%) patients were diagnosed as having had true TIA events based on the neurologist assessment in the clinic. Three patients suffered a stroke within 7 days of their initial presentation (1.3% of all patients; 2.7% of all patients diagnosed with TIA). One of these patients had a score of less than 5 on both the ABCD and ABCD2 at presentation to the ED. Five patients (2.1% and 4.4%) had a completed stroke within 30 days. Three of these presented with scores less than 5 on both the ABCD and ABCD2. The areas under the ROC curves for the ABCD score for stroke at 7 and 30 days were 0.74 (95% CI 0.40–1.00) and 0.54 (0.24–0.84), respectively. For the ABCD2 score the AUCs for the ROC curves were 0.82 (0.58–1.00) at 7 days and 0.63 (0.35–0.91) at 30 days. **Conclusion:** More than half of the patients referred to the SPC for evaluation of suspected TIA were ultimately diagnosed with a nonischemic etiology for their symptoms. Of those patients diagnosed with a true TIA, 2.7% experienced a stroke within 7 days and 4.4% within 30 days. The recommended cut-off score of 5 points or greater failed to predict a significant proportion of the strokes which

occurred within 7 and 30 days of the index presentation. **Keywords:** transient ischemic attack, risk stratification, clinical decision rule

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HYPERTONIC saline in acute traumatic brain injury? A systematic review and meta-analysis

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Introduction: Recent studies have suggested a benefit with the use of hypertonic saline (HTS) for the treatment of raised intracranial pressure (ICP) secondary to traumatic brain injury (TBI). However, the magnitude of the potential benefit conferred by HTS treatment versus alternative interventions such as mannitol (M) or lactated Ringer's (LR) is unknown. We examined the benefits and risks of HTS compared with M or LR in the treatment of raised ICP due to TBI. **Methods:** We searched the MEDLINE, Embase, ISI Web of Science, CINAHL, Scopus, Cochrane Library and Cochrane Injuries Group databases, as well as reference lists of articles and proceedings of major conferences. We contacted trial authors and experts in critical care. Randomized controlled trials were included in which subjects with severe primary TBI were assigned to treatment or control groups (placebo-controlled, no drug or different drug). Trials with a crossover design were excluded. All reviewers agreed on trial eligibility. Two reviewers independently extracted data. Missing and unpublished data were obtained from the trials' authors. The primary outcome for this review was mean ICP at 120 minutes postinfusion. Secondary outcomes included mortality, and adverse events. **Results:** We identified 5 trials (n = 143) that had acceptable methodological quality to pool in a meta-analysis, but comparable data for the primary outcome was only available for 3 trials (n = 86). Data for mortality was available for 4 trials (n = 120). The mean ICP at 120 minutes postinfusion for HTS versus controls was –2.604 mm Hg (95% CI –603 to –3.525; p = 0.006; I^2 = 13.2% REM). The difference in mortality in patients treated with HTS versus controls was 10.8% versus 30.6% (RR 0.40, 95% CI 0.17 to 0.95; p = 0.04; I^2 = 0% REM). **Conclusion:** HTS reduces mean ICP at 120 minutes postinfusion compared with control solutions, and leads to a marked improvement in mortality. HTS may benefit patients with raised ICP due to acute TBI. Further research is warranted to determine the optimal infusion tonicity and infusion time. **Keywords:** hypertonic saline, traumatic brain injury, systematic review

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EMERGENCY department targeted ultrasound for the detection of hydronephrosis

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Introduction: CT imaging of patients suspected of ureterolithiasis entails radiation exposure and prolongs ED length of stay. Emergency department targeted ultrasound (EDTU) allows rapid bedside evaluation of hydronephrosis. We compare EDTU to formal imaging for the detection of hydronephrosis. **Methods:** Patients undergoing CT or formal ultrasound of their abdomen were imaged using EDTU within 60 minutes of their test using a 3.5 MHz curvilinear ultrasound probe at the bedside. Physicians investigating these patients were experienced EDTU operators who underwent additional standardized training before their involvement in this study. Research assistants identified eligible patients, and obtained informed consent. Sample size was determined based on a power calculation. The presence of hydronephrosis was determined in a binary fashion (present or absent) and compared with formal ultrasound or CT. EDTU operators were blinded to results of formal imaging. **Results:** Of the patients, 196 were imaged with EDTU, 38 of which had hydronephrosis; 152 patients were evaluated with CT, and 44 were evaluated with formal ultrasonography. EDTU demonstrates moderate accuracy when compared with CT or formal ultrasound with a sensitivity of 82% (95% CI 65%–92%), specificity of 89% (95% CI 83%–93%), positive likelihood ratio of 7.7 (95% CI 4.7–12), and a negative likelihood ratio of 0.21 (95% CI 0.1–0.4). EDTU identified all cases of hydronephrosis seen on formal ultrasound, and only missed 7 cases identified on CT. Of 6 EDTU operators, 5 had greater than 90% accuracy compared with formal imaging, and 1 was 79% accurate. **Conclusion:** EDTU compares favourably to formal ultrasound and CT, supporting its use in the bedside evaluation of hydronephrosis. EDTU is a rapid test without radiation exposure that can aid in the diagnosis of hydronephrosis and the exclusion of other life threatening conditions. **Keywords:** emergency ultrasound, renal colic, hydronephrosis

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AN INTEGRATED rapid assessment zone and waiting room care initiative improves throughput for CTAS-III and CTAS-IV patients

Koonar H, Kathy Taylor K, Lang E, Mercuur L, Wang D, Dowling S, Innes G; University of Calgary, Calgary, AB

Introduction: The evaluation of lower acuity patients who present to the emergency department (ED) is often hampered by a lack of physical space and inefficient care. The waiting room care (WRC)/rapid assessment zone (RAZ) initiative is a multidisciplinary re-engineering of processes of care for ambulatory patients. The goal of this study was to determine its impact on measures of throughput and quality for CTAS level III and IV patients. **Methods:** Using administrative databases, measures of efficiency and accessibility were compared during a 5-month period when WRC/RAZ was in place against equal lengths of time immediately prior (IP) to WRC/RAZ implementation and during the same period 1 year earlier (1YE). All registered patients were eligible. Confounding variables including total volume and admission rates were incorporated into the analysis; nursing staffing levels were noted as well. Primary outcomes were length of stay (LOS), unplanned revisits and left without being seen (LWBS). **Results:** Of all CTAS-III and -IV patients, 29.3% were treated in WRC/RAZ during the intervention period. CTAS-III and -IV patients who presented to the ED while WRC/RAZ was operational experienced a mean LOS of 3.95 hours while the IP and 1YE patients experienced LOS of 4.47 and 4.27 hours, respectively (p < 0.0001 for both comparisons). The improvements in throughput yielded a reduction in LWBS (8.5% during WRC/RAZ, 11.1% in IP and 11.6% in 1YE time periods, p < 0.0001). Unplanned revisits within 72 hours were unaffected by WRC/RAZ (7.4% v. 7.3% and 7.6% for IP and 1YE, respectively, p = NS). Potential confounders did not influence the observed differences, and overall volume of CTAS-III and -IV actually increased during WRC/RAZ as did nurse staffing by 5.6%. **Conclusion:** WRC/RAZ implementation has led to significant improvements in throughput without compromising quality of care for CTAS-III and -IV patients. The WRC/RAZ model merits study in other centres to determine if its impact is institution-specific. **Keywords:** emergency crowding, waiting room care, operations research

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

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Introduction: Bystander CPR rates are lowest at home, where cardiac

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arrest is most likely to occur. We sought to identify barriers and facilitators to performing CPR and taking CPR training among older citizens. **Methods:** We conducted this national random-digit-dial telephone survey among independent-living individuals aged 55 and older from urban and rural settings. We randomly assigned participants to complete the CPR training or performance survey. We developed the interview guides based on the constructs of the Theory of Planned Behaviour, which elicits salient attitudes, social influences, and barriers and facilitators potentially influencing CPR training and performance. The survey instruments were developed after completion of 24 iterative interviews, verified for internal validity, and piloted before implementation. Recruitment took place between December 2009 and January 2010 until reaching 100% of the required sample size. **Results:** Demographics of the 226 interviewees: 48.2% older than 65, 58.0% women, 53.5% married, 50.9% retired, 19% completed high school, 59.7% CPR trained (most > 10 years ago), 82.7% never performed CPR. Intention to take CPR training in the next 6 months was slight. Most believe that CPR is an important skill to have, but many are afraid to forget or doing it wrong. Leading social influences are friends and spouse. Many believe courses should be free, and that more publicity is necessary. Intention to perform CPR if necessary was high. Most know that CPR is beneficial, but many believe they could harm the victim, catch a disease or get sued. People are unlikely to perform CPR if perceived to be less competent than other bystanders, but could do it if prompted by 9-1-1. **Conclusion:** This is the first national survey conducted using the Theory of Planned Behaviour to identify key facilitators and barriers to CPR training and performance. These findings will inform the design of interventional trials to improve bystander CPR and survival rates for cardiac arrest. **Keywords:** knowledge transfer, cardiopulmonary resuscitation, survey research

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PLANNING and effectiveness of an H1N1 surge protocol and lessons to be learned from implementation delay

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Introduction: For the second wave of the 2009 H1N1 Pandemic a graded provincial surge capacity response plan was developed to trigger appropriate system responses defined by patient volume increases of 10%–20%, 21%–40% or greater than 40%; or staff absenteeism of 10%–20%, 20%–30% or greater than 31%, respectively. Proposed responses included ED influenza-like illness (ILI) screening, opening influenza assessment clinics (IAC), public communication, EMS protocol changes and utilitarian care principles. This study looks at adherence to the plan and lessons learned. **Methods:** Annual differences in regional ED visit volumes were determined for the period between Sep. 15 and Dec. 15, 2008 and 2009, to identify surge levels and timing of response triggers. Data were gathered from the ED information system (EDIS) database, ED staff sick call records and the IAC records. Descriptive data are presented as proportions for categorical variables and medians with interquartile range (IQR) for continuous variables. **Results:** ILI positive ED patient volumes began rising Oct. 17, with ED visits 9.3% above normal on Oct. 19 and then returning to baseline over the next 3 days. By Oct. 25 presentations had risen 16% above normal and peaked at 42% on Oct. 28. Volumes remained greater than 10% above baseline until Nov. 11 and were greater than 20% above baseline on 6 of those 15 days. Over the same period, average daily sick leave was 6.3% presurge, 10.1% surge (11 d > 10%), and 5.6% postsurge. The IAC opened Oct. 30 and closed on Nov. 23; from Oct. 30 to Nov. 10 IAC received 248.5 (IQR 223.5–302.5) patients per day. **Conclusion:** Despite careful planning and use of EDIS data for monitoring and reporting, operational responses could have been more effective, implemented more efficiently and initiated earlier. The early lack of alternative destinations for care and delayed public educational announcements resulted in a significant number of minor ILI positive patients presenting to EDs which was eventually mitigated by the IAC opening. **Keywords:** H1N1, influenza assessment clinics, pandemic planning

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UTILITY of the ABCD and ABCD2 scores in identifying true TIA events in the emergency department

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Introduction: Distinguishing true transient ischemic attacks (TIAs) from neurologic mimickers can be difficult in the ED. The ABCD and ABCD2 scores have been derived to predict stroke risk after TIA. We sought to determine if they can also help to diagnose true TIAs in the ED. **Methods:** Prospective cohort study of all suspected TIAs referred from the ED for outpatient follow up at the Hamilton Health Sciences Stroke Prevention Clinic (SPC) from Nov. 1, 2006, to Oct. 31, 2007. ED physicians completed a referral form including all elements of the ABCD2 score. Patients were evaluated in the clinic by stroke neurologists and assigned a diagnosis of TIA versus non-TIA event based on history, examination, and imaging studies performed at the neurologists' discretion. The sensitivity, specificity and positive and negative likelihood ratios were calculated for the ABCD and ABCD2 scores for a diagnosis of TIA. ROC curves were derived for both scores. **Results:** A total of 329 patients were referred from the ED for evaluation; 44 (13.4%) did not attend their appointment. Of the remaining 285 patients, 238 (83.5%) consented and were enrolled in the study; 113 (47.5%) patients were diagnosed as having had a TIA. The area under the ROC curves for the ABCD and ABCD2 scores were 0.62 (95% CI 0.54–0.68) and 0.63 (0.55–0.69), respectively. Using a cut-off point of 5 points or greater for a diagnosis of TIA, this yielded the following measures for the ABCD score: LR (+) 1.90 (1.28–2.80), LR (–) 0.74 (0.62–0.89), sensitivity 42.5% (33.2%–52.1%) and specificity 77.6% (69.3%–84.6%). The performance of the ABCD2 score was nearly identical for each of these measures when using a cut-off score of 5 or greater for a diagnosis of TIA. **Conclusion:** More than half of the patients referred from the ED to the SPC for evaluation of suspected TIA were ultimately diagnosed with a nonischemic etiology for their symptoms. Neither of the ABCD or ABCD2 scores performed well enough to be recommended as a useful tool to assist ED physicians in distinguishing true TIAs from nonischemic mimickers. **Keywords:** transient ischemic attack, risk stratification, clinical decision rules

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ONE-year outcomes of patients undergoing electrical cardioversion for atrial fibrillation in the emergency department: a prospective analysis

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Introduction: While the short-term (< 7 d) safety of electrical cardioversion (DC CV) for emergency department (ED) patients with atrial fibrillation (AF) have been established, the long-term outcomes have not been reported. **Methods:** A prospective 2-centre cohort of consecutive ED patients undergoing DC CV for atrial fibrillation between Apr. 1, 2006, and Dec. 31, 2008, was enrolled. AF patients with acute underlying illnesses or those deemed hemodynamically unstable were excluded. Information collected included patient demographics, cardiovascular risk factors (in the form of a CHADS 2 score), vital signs, EKGs, medical treatment, consultations, and admissions. Procedural sedation data collected included patient ASA

class, medications given, success of cardioversion and prespecified adverse events. This cohort was probabilistically linked with both a regional ED database and the provincial health registry to determine which patients had a subsequent ED visit or hospital admission, stroke or thromboembolic event, or died within 1 year. Data was analyzed by descriptive methods. **Results:** During the study period, 244 patients were enrolled and 22 excluded. Of the 222 eligible patients, 167 (70%) had a CHADS 2 score of 0 and 201 (84%) had prior AF. All those who converted to NSR were discharged from the ED, but 27 patients failed DCCV (11.3%, 95% CI 7.3%–15.4%) and 14 were admitted (5.9%, 95% CI 2.9%–8.9%). During 1-year follow-up, 1 patient died of unrelated causes (95% CI 0.0%–1.3%) and no patients had a stroke or thromboembolic event (95% CI 0.0%–1.3% for both). 13 patients (5.5%, 95% CI 2.6%–8.4%) had an ED adverse event that did not change disposition. 116 (52%) patients had 270 ED visits and 19 admissions in the following year. **Conclusion:** In this low-risk group of ED patients with AF, electrical cardioversion appears to have few long-term complications. **Keywords:** atrial fibrillation, cardioversion, prognostic study

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PROGRESSION of EM competence: Delphi method for derivation and validation of milestones

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Introduction: Residency education is evolving to be more competency-based and organized around milestones that define progression of specialist ability. However, there are currently no published milestones to guide Canadian emergency medicine (EM) residency teaching, learning or assessment. **Methods:** We employed a modified Delphi method and the CanMEDS roles as applied to EM to develop a framework of descriptive competency markers for residency education. Starting with the Royal College of Physicians and Surgeons of Canada's CanMEDS-based EM objectives of training, we engaged our group of EM educators (n = 19) to define the essential milestones for each CanMEDS domain for years 1 to 5 of residency education. These were then validated by the larger group academic EM physicians (n = 51) in serial iterations until consensus. **Results:** We achieved consensus on a "Progression of EM Competence" milestones framework after 7 iterations of the group process. The final framework divided the 7 CanMEDS roles further into 11 applicable horizontal domains of EM (knowledge and clinical reasoning, procedures, communicator, collaborator, health advocate, manager, teaching, lifelong learning, critical appraisal, research and professional). Postgraduate years 1 and 2 included 43 milestones, PGY3 included 44 milestones, and PGY 4 and 5 included 44 milestones. **Conclusion:** We developed and validated a novel "Progression of EM Competence" milestones framework suitable to guide teaching, learning, and assessment of Canadian training. All EM training programs should consider adopting a framework like this one. **Keywords:** clinical competence, CanMEDS, Delphi methodology

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OUTCOMES of patients who present to the emergency department because of an adverse drug event

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Introduction: Adverse drug events (ADEs) are a common cause of preventable nonsurgical adverse events. Drug related visits (DRVs) — defined as ED visits due to an ADE — are a leading cause of adult emergency department (ED) visits. Our objectives were to compare mortality, health services utilization and cost of care in patients with and without DRV. **Methods:** This prospective observational study enrolled adults presenting to a tertiary care ED. Pharmacists evaluated all patients for DRVs using standardized algorithms. Emergency physicians (EPs), blinded to the pharmacist opinion, were interviewed at the end of each shift to determine if they felt the patient's ED visit was a DRV. An independent committee reviewed and adjudicated cases in which the EP and pharmacist assessments were discordant or uncertain to establish a criterion standard. Data from the index ED visit were linked to vital statistics and administrative health utilization and cost of care data using provincial health numbers. Patients were followed for 6 months after the index ED visit. **Results:** Of 1000 enrolled patients, 122 (12.2%, 95% CI 10.3%–14.4%) were diagnosed with a DRV. We found no difference in mortality during the follow-up period among patients who presented with or without a DRV. The adjusted odds of being hospitalized on any day during follow-up were 1.51 (95% CI 1.41–1.61, $p < 0.001$) greater in the DRV group than the non-DRV group. The adjusted median monthly cost of care was 1.88 times higher (95% CI 1.16–3.05, $p = 0.010$) for DRV than non-DRV patients. **Conclusion:** Patients with a DRV spend more time in hospital, and incur greater health care costs in the 6 months following the index ED visit than patients presenting for other reasons. ADEs warrant further investigation to explore the development of preventive strategies. **Keywords:** adverse drug events, drug related visits, patient safety

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FACTORS associated with the successful recognition of agonal breathing and cardiac arrest by 9-1-1 communications officers: a qualitative iterative survey

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Introduction: Agonal breathing can delay recognition of cardiac arrest and delivery of CPR instructions by 9-1-1 communication officers (COs). We sought to identify barriers and facilitators to COs ability to recognize cardiac arrest and agonal breathing. **Methods:** We conducted semistructured qualitative interviews with a purposeful sample of COs from 4 Canadian provinces. We developed an interview guide based on the constructs of the Theory of Planned Behaviour, which elicits salient attitudes, social influences, and behavioural control potentially influencing COs ability to recognize agonal breathing as a symptom of cardiac arrest. 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:** We interviewed 24 COs from Ontario, Quebec, New Brunswick and Nova Scotia (67% female, median 9.5 years' experience, 92% full time employees, 33% had paramedic training). Leading attitudes were as follows: 1) afraid to cause harm by teaching CPR if unsure victim is in cardiac arrest; 2) agonal breathing is an early sign of death; and 3) dispatch-assisted CPR instructions can improve survival. Leading social influences came from: 1) management/quality assurance staff; 2) other health care providers; and 3) national cardiovascular organizations. Behavioural control was the construct most associated with COs' ability to recognize cardiac arrest including: 1) adherence to existing scripted protocol; 2) poor caller description of breathing pattern; and 3) lack of education about agonal breathing. **Conclusion:** This is the first qualitative study using the Theory of Planned Behaviour to identify key facilitators and barriers for cardiac arrest recognition by 9-1-1 COs. These findings will inform the design of a national survey, and interventional trials to improve the

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diagnostic accuracy of COs and the efficient delivery of CPR instructions. **Keywords:** cardiopulmonary resuscitation, agonal breathing, qualitative research

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CONSENSUS on evidence-based quality of care indicators for Canadian emergency departments

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Introduction: Currently, no standard or widely accepted quality of care and patient safety measures for ED care exist in Canada, thus hampering efforts for common measurement, cross-jurisdiction comparisons and evaluation of interventions to improve care. The purpose of this project was to select and prioritize from among existing quality of care indicators a parsimonious, evidence-based set of indicators for Canadian EDs. **Methods:** Nationally representative clinical, administrative and quality experts participated in a modified Delphi panel and nominal review process over 2008/09. Expert panelists reviewed and prioritized candidate indicators identified in a comprehensive literature review and environmental scan; indicators were rated on dimensions of scientific soundness (evidence-based link to outcomes) and relevance/importance to patients or providers. A steering committee selected the final indicator set based on expert panel ratings (though revisions were permitted); the final set of indicators was then prioritized within clinical groupings by expert panelists. A feasibility review was also conducted. **Results:** A total of 170 candidate indicators were generated from the literature and assessed by panelists in 2 survey rounds. A final set of 48 were selected and prioritized within 8 clinical/operational categories. Feasibility review determined that 13 indicators out of 48 can currently be captured using existing administrative databases; and a further 9 would be feasible with improved/enhanced data quality in existing data elements. **Conclusion:** The prioritized indicators have face-validity representing many of the most serious/acute emergencies seen in EDs. Next steps include specification of technical definitions, developing appropriate and valid data sources for longitudinal and cross-jurisdiction measurement, and regularly reviewing and revising the indicators to ensure they remain relevant and accurately reflect current knowledge and practice. **Keywords:** quality of care, patient safety, Delphi methodology

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METHODOLOGICAL quality of reports of interventions to improve emergency department overcrowding: a systematic review

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Introduction: Emergency department (ED) overcrowding is a major concern for most urban and high-volume hospitals, and interventions to reduce overcrowding are urgently required. Decision-makers require the highest quality evidence upon which to base decisions. This study evaluated the quality of methods used in ED overcrowding intervention research. **Methods:** Electronic databases (Cochrane Central Register of Controlled Trials, MEDLINE, Embase, Web of Science, HealthSTAR, Dissertation Abstracts, ABI/INFORM Global), controlled trial registry websites, conference proceedings, study references, experts in the field and correspondence with authors were used to identify potentially relevant studies involving interventions to reduce ED overcrowding. Interventional studies in which any intervention was used to influence ED overcrowding metrics (length of stay, left without being seen, etc.) were included. Two reviewers independently assessed citation relevance, inclusion and study quality. The methodological quality of studies was scored using the modified Effective Public Health Practice Project (EPHPP) tool. **Results:** From 14 716 potential relevant studies, 354 were potentially relevant and 183 were retained. The most common topics were triage liaison physician (29) and system wide interventions (29). Controlled clinical trials were infrequent (19.5%); most studies employed single-centred before–after designs. The majority of studies were classified as weak (85.7%) using the EPHPP tool. Selection bias, lack of valid and reliable outcomes, failure to compare groups between study periods or adjust for confounders, and inadequate statistical reporting were common limitations. **Conclusion:** Any efforts to synthesize evidence in ED overcrowding interventions using systematic review methods will produce potentially misleading conclusions due to weak study methodologies. Future efforts should be targeted at improving the quality of research conduct and reporting in this field. **Keywords:** emergency crowding, research methodology, systematic review

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FACTORS influencing the intentions of nurses and respiratory therapists to use automated external defibrillators during in-hospital cardiac arrests: a qualitative iterative survey

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Introduction: Nurses and respiratory therapists (RTs) can initiate CPR during in-hospital cardiac arrest, but most of them are not allowed to use automated external defibrillators (AEDs). We sought to identify barriers and facilitators to AED use by nurses and RTs during in-hospital cardiac arrest before implementing a new medical directive. **Methods:** We conducted semistructured qualitative interviews in person or by telephone with a purposeful sample of nurses and respiratory therapists from various clinical settings, including medical/surgical wards, critical care units, operating rooms and out-patient clinics. We developed an interview guide based on the constructs of the Theory of Planned Behaviour, which elicits salient attitudes, social influences and behavioural control potentially influencing the use of AEDs during in-hospital cardiac arrests. 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 of the 24 interviewees (19 nurses, 5 RTs) are as follows: mean age 41, female 79.2%, used CPR on victim 87.5%, used AED on victim 29.2%. Leading attitudes were as follows: 1) faster defibrillation may improve patient survival, 2) AEDs are easy to use, 3) AED rhythm analyses may be inaccurate and shock inappropriately. Leading social influences came from the following: 1) physicians, and 2) hospital administrators. Behavioural control was the construct most associated with the ability to use an AED, including the following: 1) training and familiarity with AED use, 2) policy allowing AED use, and 3) unclear role during resuscitation. **Conclusion:** This is the first qualitative study using the Theory of Planned Behaviour to identify key facilitators and barriers for in-hospital use of AEDs by nurses and RTs. These findings will inform the design of a provincial survey, and education research focused on safety, and efficacy of AED use by nurses and RTs. **Keywords:** automated external defibrillators, cardiac arrest, qualitative research.

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EFFECTIVENESS and adverse event profile of different procedural sedation and analgesia regimens in injection drug users: a prospective comparison

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Introduction: Injection drug users (IDUs) often require procedural

sedation and analgesia (PSA) as part of emergency department (ED) treatment. However, the optimal sedation strategy remains unclear. This observational study compares adverse event (AE) rates in different PSA regimens. **Methods:** As part of quality assurance procedure, IDU status was documented among consecutive patients undergoing PSA at 2 urban Vancouver EDs from Apr. 1, 2006, to Jan. 31, 2009. Structured data describing comorbidities, vital signs, sedation regimens and medical treatments were collected, along with prespecified AE. PSA regimens consisted of propofol (PR), fentanyl-midazolam (FM), and ketamine-propofol (KP). The primary outcome was rate of AE in each group. Secondary outcomes included the recovery time and ED length of stay (LOS) for nonadmitted patients, stratified by group. Secondary outcomes were analyzed by nonparametric methods. **Results:** A total of 198 consecutive patients participated; 110 received PR, 54 FM and 44 KP. Ages, vital signs and presenting complaints were similar in each group. There were 2 AEs in the PR group, both patients with transient apnea (1.8%, 95% CI 0%–4.3%). Two patients in the FM group required reversal agents (3.7%, 95% CI 0%–8.7%) Three emergence reactions were recorded in patients receiving KP (6.8%, 95% CI 0%–14%). (For the primary outcome, $p = 0.90$ by 1-way ANOVA). No AE changed patient disposition. Median recovery times were 25 (IQR 18–36) minutes, 27 (IQR 22–45) minutes and 30 (IQR 20–40) minutes, respectively ($p = 0.88$). Median ED LOS for the 165 discharged patients was 3.0 (IQR 2.5–4.3) hours, 3.5 (IQR 3.0–4.5) hours and 4.0 (IQR 3.4–5.5) hours, respectively ($p = 0.67$). **Conclusion:** All 3 medication regimens for PSA in IDU appear safe and resulted in few AE. Recovery times and ED LOS were similar for all groups. **Keywords:** procedural sedation, injection drug use, adverse event, prospective study

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TREATING febrile neutropenia: the role of an electronic clinical practice guideline (eCPG)

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Introduction: Febrile neutropenia (FN) is a potentially life-threatening condition that requires urgent attention and management in the emergency department (ED). Evidence-based clinical guidelines for managing FN have been developed; however, the integration of guidelines into routine practice is often incomplete. We evaluated the impact of implementing an electronic clinical practice guideline (eCPG) on the management and outcomes of patients presenting to the ED with FN. **Methods:** A retrospective chart review over a 3-year period at 4 hospitals in Edmonton, Alta., was performed. Potentially eligible patient visits were identified by searching the Ambulatory Care Classification System database using ICD-10 codes and ED physician diagnoses of FN. ED patients with fever (> 38°C at home or in ED) and neutropenia (WBC count of < 1000 cells/mm^3 or a neutrophil count of < 500 cells/mm^3) and receiving an ED diagnosis of FN were included. Bivariable analyses were performed using χ^2 or Mann–Whitney U tests according to the nature of the variables. **Results:** From 371 potential cases, 201 unique cases of FN were included. Overall, the eCPG was used in 76 of 201 (37.8%) patient visits; however, there were significant differences in eCPG utilization between hospitals. eCPG usage were highest at the academic health sciences centre where it was developed (57%). The implementation of the eCPG increased the proportion of FN patients receiving an ECG (46.9% v. 31.5%, $p = 0.03$) and having blood cultures drawn (96.1% v. 93.1%, $p = 0.04$). The eCPG correlated with a decrease in time from triage to first antibiotic by 1 hour compared with the 3 control hospitals (3.9 v. 4.9 h, $p = 0.02$). Patients presenting to control hospitals were also more likely to be discharged home (15.1% v. 7.0%, $p = 0.04$). **Conclusion:** The eCPG is a safe and useful clinical tool that can improve patient management in the ED, and strategies to increase its utilization in this and other regions should be pursued. **Keywords:** febrile neutropenia, electronic decision support, clinical practice guidelines.

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CONSENSUS on paramedic clinical decisions during high acuity emergency calls: results of a Canadian Delphi study

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Introduction: Paramedics make decisions which impact clinical outcome and patient safety. This Delphi study sought to establish consensus on the most important clinical decisions paramedics make during high acuity emergency calls. **Methods:** Canadian paramedics and medical directors participated in this multiround online survey. In Round I, participants listed important clinical decisions. In Round II, participants scored each decision in terms of its importance for patient outcome and safety on a 5-point Likert scale. In Rounds III and IV, participants could revise their scores. Consensus was defined a priori: if 80% or more of the panel scored a decision important or extremely important, it was included. **Results:** The panel (17 paramedics, 7 medical directors) had a mean 16.5 years experience. Response rates were as follows: Round I: 96%; II: 92%; III: 83%; IV: 96%. Consensus was reached on 42 decisions, grouped into 6 categories: airway management ($n = 13$); assessment ($n = 3$); cardiac management ($n = 7$); drug administration ($n = 9$); scene management ($n = 4$); general treatment ($n = 6$). The highest level of consensus was the assessment category (97% scored assessment decisions important or extremely important). Paramedics scored 4 decisions higher than medical directors: Decide on airway device ($p < 0.04$); Perform chest decompression ($p < 0.01$); Begin chest compressions on decompensated child ($p < 0.04$); Decide when to leave scene versus stay ($p < 0.02$). Medical directors scored one decision higher than paramedics: Give epinephrine for anaphylaxis ($p < 0.04$). **Conclusion:** In a Delphi study of clinical decision-making by paramedics in high acuity emergency calls, consensus was reached on 42 decisions in 6 categories, with the highest level of consensus on assessment decisions. The decisions found to be most important for patient outcome and safety should be a focus of paramedic training, continuing education and clinical auditing. **Keywords:** paramedic decision-making, prehospital, online survey research.

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PREDICTORS of hospitalization in patients presenting to the emergency department with recent-onset of atrial fibrillation and flutter

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Introduction: The Recent-onset Atrial Fibrillation and Flutter (RAFF) study demonstrated that the decision to treat patients with either a rate or rhythm control dominated strategy is site-dependant, reflecting local practice patterns and an absence of clear guidance from clinical research. We sought to identify the primary drivers of the decision to admit patients with RAFF. **Methods:** This was a Canadian multicentre health records review with unique case identification and central quality control, conducted at 8 centres over a 12-month period. Eligible patients demonstrated RAFF requiring emergency management. In this secondary analysis of the RAFF database, univariate t test or χ^2 analyses were conducted to select factors related to admission decision at a significance level of $p < 0.05$ and multiple logistic regression was employed to evaluate independent predictors of the decision to admit after adjustment. **Results:** Overall, 1068 patients were included, 178 of whom were hospitalized (16.7%),

range by site (10%–27%). Seven factors emerged as independent predictors of admission. These included the following: associated acute coronary syndrome or congestive heart failure (OR 10.2, 95% CI 4.0–26.3); use of heparin in the ED (OR 4.1; 95% CI 1.7–9.4); atrial flutter (OR 3.2, 95% CI 2.1–4.8); new ischemic changes on ECG (OR 2.7, 95% CI 1.7–4.3) age by decade (OR 1.6, 95% CI 1.4–1.8); elevated heart rate at time of disposition by 10 beats/min (OR 1.4, 95% CI 1.3–1.6) and conversion to sinus rhythm (OR 0.39, 95% CI 0.26–0.59). The triage level, site and CHADS score were not independent predictors of hospitalization. **Conclusion:** Multiple variables were positively associated with hospitalization in this population; however, conversion to sinus rhythm was associated with discharge. Admission of RAFF patients is driven largely by rational clinical parameters. Further research should define whether these factors predict clinical outcomes that would benefit from hospital admission. **Keywords:** atrial fibrillation, admission predictors, health records review

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CLINICAL experience predicts CT utilization rates in lower acuity patients

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Introduction: CT imaging is increasingly stressing emergency department (ED) resources and a contributor to prolonged length of stay. Recent studies of utilization have demonstrated significant variability among physicians in CT imaging rates. Exploring the nature of this variability can lead to more rational CT usage. Our objective was to identify emergency physician (EP) characteristics associated with both high and low rates of CT use. **Methods:** This administrative database study was conducted at 3 adult EDs over a 1-year period. Every visit and CT image was linked to a hospital site and an EP. To minimize confounders and provide a more homogenous sample, only CTAS-3 patients were included. Predictor variables included for analysis were EP's age, gender, years in practice, training path (EM v. FRCP) and number of patients seen per hour. EPs were categorized into 1 of 3 groups based on their CT ordering rates (quartiles): high CT users (top 25%), control (middle 50%) and low CT users (bottom 25%). **Results:** During the 1-year period, 93 510 CTAS-3 patients were treated by the 115 EPs included in the study. The mean CT usage rate was 12.0%. Comparing the highest CT users (> 15% CT ordering rate) to the control group, none of the following variables were significantly predictive (odds ratio and 95% CI): age = 1.01 (95% CI 0.96–1.07), years in practice = 1.01 (95% CI 0.96–1.07), EM versus FRCP trained = 0.90 (95% CI 0.42–2.66), patients seen per hour = 1.39 (95% CI 0.46–4.21). Comparing low CT users (< 10% ordering rate) to the control group, increased age and years in practice were predictive of reduced use: age = 1.08 (95% CI 1.03–1.15); years in practice = 1.07 (95% CI 1.02–1.13). **Conclusion:** In this study, physician age and clinical experience were associated with lower CT imaging rates. We did not identify any variables that were significantly predictive of high CT usage. Further research should examine the patient outcomes these extremes in practice pattern and to better understand the rationale employed by more limited CT users. **Keywords:** CT utilization, low acuity ED patients, administrative database study

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IMPACT of learners on emergency department length of stay

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Introduction: Delayed disposition from the emergency department (ED) contributes to increased length of stay (LOS) and overcrowding, and may be influenced by the presence of learners. We evaluated the effect of learners on ED LOS. **Methods:** All patients aged 17 years or older who presented to a Canadian academic tertiary care ED from Jul. 1, 2008, to Jun. 30, 2009, were retrospectively reviewed using an electronic database. Direct admissions, patients assessed initially by a triage physician or who left without being seen were excluded. Patients were managed by an emergency physician (EP), EP plus resident (RES) or EP plus medical student (STU). The RES category was further stratified into junior emergency (RES-JR), senior emergency (RES-SR) or junior nonemergency (RES-OFF) residents. ED LOS was defined as time from triage to consult for admitted patients and to discharge for nonadmitted patients. Outcomes were compared by analyses of variance. **Results:** Visits were classified as EP (n = 28 685), RES (n = 7307) or STU (n = 1233). Mean LOS for nonadmitted EP patients was 5.6 hours (95% CI 5.6–5.7), compared with STU (6.3 h, 95% CI 6.1–6.6) and RES-OFF (6.4 h, 95% CI 6.2–6.5) groups (both $p < 0.001$); however, there was no significant difference with the RES-JR (6.0 [95% CI 5.7–6.3], p = 0.24) or RES-SR (5.8 [95% CI 5.6–6.0], p = 0.16) groups. Mean time from triage to consult for admitted patients was 4.5 hour (95% CI 4.5–4.6) for the EP group, compared with 5.2 hour (95% CI 4.9–5.5) for the STU and 5.2 hour (95% CI 5.0–5.4) for the RES-OFF groups (both $p < 0.001$); however, there was no significant difference between EP and RES-JR (5.0 [95% CI 4.6–5.4], p = 0.25) or RES-SR (4.3 [95% CI 4.2–4.5], p = 0.50). **Conclusion:** ED disposition times were observed to increase when medical students and off-service residents were involved in-patient care but not when emergency residents were involved. Efforts to reduce ED patient delays in teaching centres should be explored. **Keywords:** medical education, emergency crowding, administrative database research

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PRESENTATIONS to emergency departments in Alberta, Canada, for atrial fibrillation: a large population-based study

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Introduction: Atrial fibrillation (AF) is the most common chronic cardiac arrhythmia and the most common acute arrhythmia seen in the emergency department (ED); however, the burden of acute AF on EDs is virtually unknown. We describe the epidemiology of presentations to EDs for AF made by adults (age ≥ 35) in Alberta, Canada. **Methods:** Provincial administrative databases were used to obtain all ED encounters coded as primary or secondary AF during April 1999 to March 2005. Medical records nosologists were responsible for all abstract coding across the province. Information included demographics, ED visit timing and subsequent visits to non-ED settings. Data analysis included descriptive analyses, odds ratios (ORs) with 95% confidence intervals (CIs) and standardized rates. **Results:** There were 42 710 ED visits for AF made by 21 880 individuals. Most (65.2%) had only one AF-related ED visit; males (52.1% of ED visits, 51.0% of individuals) and females were similarly represented. Patients over the age of 65 represented 71% of the ED visits. The standardized rates increased from 4.2 per 1000 in 1999/2000 to 4.7 per 1000 in 2002/03 and stabilized at 4.5 per 1000 in 2004/05. Of the total visits, 34.2% required hospitalization. The 2 major urban regions had higher admission proportions than elsewhere (OR 1.32, 95% CI 1.27–1.38) elsewhere. In a discharged subset, 9% had a repeat ED visit within 7 days. The median time to the first follow-up was 6 days. **Conclusion:** Acute AF is a common ED presentation, most patients are discharged following treatment, relapses are common and most patients do not receive timely follow-up. Given the potential complications of AF, improvements in ED and outpatient treatment of this disease in Canada are needed. Further research is required to understand the reasons for practice variation. **Keywords:** atrial fibrillation, provincial database, population research

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ADDITIVE value of codeine for pain management of children presenting to the emergency department with a musculoskeletal trauma

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Introduction: Few studies focused on the efficacy of a combination of an anti-inflammatory drug and an opioid to relieve musculoskeletal pain for children. We evaluated the analgesic efficacy of adding an opioid (codeine) to the standard analgesic agent given at triage (ibuprofen) on the pain intensity of children presenting to the emergency department (ED) with a musculoskeletal trauma. **Methods:** This was a randomized, double-blind controlled trial with 2 groups. Patients 6 to 17 years old who presented to an ED with pain secondary to a musculoskeletal trauma in the preceding 72 hours were block-randomized to receive orally ibuprofen (10 mg/kg, max = 600 mg) and codeine (1 mg/kg, max = 60 mg) or ibuprofen and placebo at triage. Children, parents and research nurses were blinded to patients' assignments. Pain was assessed with the Visual Analog Scale (0 to 10) (VAS) at baseline, 60, 90 and 120 minutes after medication administration. The changes in the VAS scores over time were compared between both groups. **Results:** A total of 192 patients were eligible, 94 refused to participate and 15 were missed. Of the 83 recruited patients, 41 were randomized to the ibuprofen and codeine group and 42 to the ibuprofen and placebo group. There were no statistically significant differences in demographics, injury characteristics and pain scores at baseline between the 2 groups. No significant differences were obtained in improvement in pain scores at all times between both groups. Both treatment groups demonstrated a decrease in the pain scores over time ($p = 0.001$). However, mean pain scores remained over 4/10 for both groups at 120 minutes. Adverse effects were minimal. **Conclusion:** The combination of codeine with ibuprofen did not improve significantly pain management of children with an acute musculoskeletal trauma compared with ibuprofen with a placebo. The pain control level provided by the medications in our study remained suboptimal for the patients. **Keywords:** pain management, codeine, randomized controlled trial

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THE IMPACT of ED admission delays on inpatient outcomes

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Introduction: We sought to determine the impact of delays to admission from the emergency department (ED) on inpatient length of stay (LOS), IP cost and in-hospital mortality. **Methods:** We conducted a retrospective analysis of 13 460 adult (≥ 18 yr) ED visits between Apr. 1, 2006, and Mar. 30, 2007, at 2 ED sites of one hospital in which the mode of disposition was admission to ICU, surgery or inpatient wards. We defined ED admission delay as ED LOS greater than 12 hours. The primary outcomes were IP LOS, total IP cost and in-hospital mortality. **Results:** Approximately 11.6% ($n = 1558$) of admitted patients experienced admission delay. In multivariate analysis we found that admission delay was associated with 12.4% (95% CI 6.6%–18.5%) longer IP LOS and 11% (6.0%–16.4%) greater total IP cost. Delayed patients were more likely to die in hospital than nondelayed patients, with odds ratios of 2.90 (1.84–4.56), 1.93 (1.42–2.63) and 1.52 (1.21–1.92) for 5, 10 and 30 day mortality rates, respectively. We estimated the cumulative impact of delay on all delayed patients as an additional 2183 inpatient days and an increase in IP cost of $2 109 173 at the study institution. **Conclusion:** Delays to admission from the ED are associated with increased IP LOS, IP cost and hospital mortality. Improving patient flow through the ED may reduce hospital costs and improve quality of care. There may be a business case for investments to reduce ED admission delays. **Keywords:** admission delays, emergency crowding, impact analysis

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EMERGENCY physician survey of American and Canadian emergency department management of recent-onset atrial fibrillation

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Objectives: ED management for patients with recent-onset atrial fibrillation (< 48 h duration) is complex and controversial and we suspect there is much variability in practice. The purpose of this study was to conduct an American and Canadian ED physician survey to determine practice variation in the management of recent-onset atrial fibrillation with regard to rate control, rhythm control and patient disposition. **Methods:** We conducted a mail survey of a random sample of 500 American College of Emergency Physicians (ACEP) members and email survey of 1180 Canadian Association of Emergency Physicians (CAEP) members using the modified Dillman technique. One prenotification letter and 3 survey letters were sent. Twenty-three survey questions focused on use of rate control medication, use of rhythm control medications, use of electrical cardioversion and patient follow-up. These data were analyzed using descriptive and χ^2 statistics with 95% CIs. **Results:** Overall 735 responses were received, for a 43.8% response rate overall, with 42.9% for the United States and 45.8% for Canada. Physician demographics include the following: male 72%, mean age 41 years and mean experience 10 years. Drugs of choice for drug cardioversion were as follows: Canada — procainamide 51.6% and the United States — amiodarone 39.7% ($p < 0.0001$). **Conclusion:** There are striking differences between US and Canadian ED management for recent-onset atrial fibrillation, especially for the relative roles of rate control versus rhythm control, drug first versus electrical first for cardioversion and choice of drugs. This variation likely reflects the need for further studies to develop better evidence to guide ED management of this common dysrhythmia. **Keywords:** atrial fibrillation, practice variability, survey research

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VISIBILITY of the urethral opening does not correlate with risk of urinary tract infection in uncircumcised boys

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Introduction: Urinary tract infections (UTIs) are the most commonly diagnosed serious bacterial infections among young children. Uncircumcised boys are at higher risk for UTI. The goal of this study was to compare the rate of positive urine cultures among 3 groups of uncircumcised boys with the rate in circumcised boys: those with a completely visible (CV), partially visible (PV) and nonvisible (NV) urethral opening. **Methods:** This was a prospective cohort study in a tertiary care pediatric ED. All boys presenting to the ED for whom a catheter urine specimen was requested were eligible. Exclusion criteria were recent bladder catheterization, antibiotics within less than 72 hours or any anomaly that precluded catheterization. Bladder catheterization was performed by the ED nurses who completed a questionnaire. We used χ^2 analysis to compare between groups and multivariable logistic regression analysis to allow adjustment for potential covariates. **Results:** We enrolled a total of 405 boys, of whom 395 were analyzed for the primary outcome. The median age was 4 months (1 d–42 mo). The distribution of visibility among the groups was as follows: 84 (21%) were circumcised, 164 (33%) were NV, 107 (21%) were PV and 40 (8%) were CV. The rate of positive

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urine cultures and odds ratios (OR, 95% CI) in circumcised boys was 4.8% versus 26.7% in uncircumcised boys (5.29, 2.07–13.53). Among uncircumcised boys, the rate of positive urine cultures was 26.8% (5.8, 2.2%–15.3%) in NV, 20.6% (4.1, 1.5%–11.3%) in PV and 30% (6.77, 2.2%–20.9%) in CV. Adjusting for age and fever did not affect these findings. **Conclusion:** The results of our study failed to demonstrate a hierarchy of risk for positive urine cultures among uncircumcised boys. We conclude that among boys for whom UTI is being considered during their ED evaluation, those who are uncircumcised are at higher risk compared with circumcised boys irrespective of the degree of visibility of the urethral opening. **Keywords:** urethral visibility, urinary tract infection, pediatric emergency medicine

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THE DEVELOPMENT and validation of a simulation-based OSCE with basic resuscitation scenarios in emergency medicine

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Introduction: There is increasing emphasis on performance-based assessment in postgraduate medical training programs. We set out to develop and validate a 3-station simulation-based Objective Structure Clinical Examination (OSCE) tool to assess emergency medicine resident competency in basic resuscitation scenarios. **Methods:** An expert panel of emergency physicians developed 3 scenarios to be used as OSCE stations with high-fidelity mannequins, each with a corresponding assessment tool comprised of 2 separate checklists: essential actions (EA) and global assessment score (GAS). The scenarios were (1) unstable ventricular tachycardia, (2) respiratory failure and (3) ST-elevation myocardial infarction. A total of 22 emergency medicine residents were videotaped completing the examination scenarios over a 2-day period. A separate panel of 3 clinician experts independently evaluated the videotapes using the assessment tool after receiving appropriate training. Correlational analyses and analysis of variance were applied to the assessment of the performance of each tool. **Results:** A total of 22 residents completed the OSCE (10 CCFP-EM, 6 Junior FRCP-EM, 6 Senior FRCP-EM). Interrater reliability for the EA scores was good, but varied somewhat between scenarios (Spearman rho = [1] 0.68, [2] 0.81, [3] 0.41). Interrater reliability for the GAS was also good (rho = [1] 0.64, [2] 0.56, [3] 0.62). When comparing GAS scores, senior FRCP residents outperformed junior residents and CCFP-EM residents in all 3 scenarios ($p \leq 0.001$ to 0.01). When comparing EA scores, senior FRCP residents outperformed CCFP-EM residents in all 3 scenarios and junior residents in 2 of the 3 scenarios ($p = 0.006$ to 0.04). **Conclusion:** Study findings demonstrate the considerable value of high fidelity medical simulations for assessment of basic resuscitation skills among medical trainees. We anticipate that this preliminary work will provide a foundation for continued development of simulation-based assessment tools in the future. **Keywords:** simulation, OSCE, resuscitation

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ROAD testing a new ED before going live: how to use exercises to design and test a new patient flow model

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Introduction: Designing and opening a new emergency department (ED) is a complicated task that requires designing a new patient flow model. We decided to use exercises to help design and test our new ED before going live. **Methods:** A group of ED staff members participated in weekly tabletop exercises during the months leading up to the opening of the new ED. At each meeting, a tabletop exercise was conducted using a "board game" format. The "board" for each tabletop exercise was a large-scale diagram of the ED, updated each week to reflect the improvements identified the previous week. The "pieces" were Post-its representing individual patients with a brief clinical story attached. The clinical stories were designed to test specific clinical requirements and timelines. At the same time, a live exercise was carried out 2 weeks before going live. The live exercise used 40 simulated patients whose clinical histories and presentations were designed to challenge both the space and the staffing aspects of the redesign. **Results:** The use of repetitive tabletop exercises allowed a functional layout and division of labour to evolve over time. This process allowed certain clinical problems to come to light, including issues around registration, printing charts and patient waiting areas. The live exercise identified numerous issues around staff roles and clinical support, but also demonstrated many aspects that were highly functional. **Conclusion:** Used together, the tabletop and live exercises identified both patient flow patterns and staff assignments that required revision, and contributed to significantly reduced stress during the period immediately following the move. **Keywords:** ED design, tabletop exercises, patient flow

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THE IMPACT of system wide interventions on ED overcrowding: a systematic review

Rowe BH, Guo XY, Wong L, Villa-Roel C, Schull MJ, Vandermeer B, Ospina M, Holroyd BR, Bullard M, Innes G; University of Alberta, Edmonton, AB

Introduction: The cause of emergency department (ED) overcrowding is multifactorial, and system wide interventions (SWIs) have been proposed as an effective method to improve crowding metrics. The aim of this study was to determine the available evidence for SWI and summarize their influence on ED overcrowding. **Methods:** Electronic databases (Cochrane Central Register of Controlled Trials, MEDLINE, Embase, Web of Science, HealthSTAR, Dissertation Abstracts, ABI/INFORM Global), controlled trial registry websites, conference proceedings, study references, experts in the field and correspondence with authors were used to identify potentially relevant SWI studies. Interventional studies in which SWI was used to influence ED overcrowding metrics (length of stay [LOS], left without being seen [LWBS]) were included. Two reviewers independently assessed the citation relevance inclusion, and study quality. Weighted mean differences were calculated and reported with corresponding 95% confidence intervals (CIs). **Results:** From 14 716 potential relevant studies, 29 were included in the systematic review. Eighteen were journal publications, 3 were Web-based articles, 7 were abstracts and 1 was a report. Most studies (86%) used single-centred ED designs. Fifteen trials were conducted in the United States; however, other countries were represented. Only one study was rated as high quality; 4 were graded as moderate quality; all others were assessed as weak. Overall, 11 of 15 studies reporting ED LOS concluded that SWI resulted in shorter LOS compared with a control period; however, heterogeneity ($I^2 = 99\%$) precluded pooling. Nine studies reported that SWI decreased in LWBS. **Conclusion:** Overall, the systematic review indicated that SWI is an effective method to reduce ED overcrowding. The available evidence is limited by variability of interventions, poor methodologies and incomplete reporting. It is unclear at this point whether the efforts required to establish a SWI are rewarded with sufficient improvements in ED overcrowding. **Keywords:** system-wide interventions, emergency crowding, systematic review

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SHORT-term functional impacts of minor injuries in community elders seen in an emergency department

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Introduction: Some previously independent elders treated for minor injuries in an emergency department (ED) may experience functional decline on the short-term. Our objective was to evaluate the functional decline of injured independent elders 3 months after an ED visit. **Methods:** Setting and population: A prospective pilot cohort study in 3 university-affiliated Canadian EDs was performed over 9 months. Patients aged 65 years and older, with minor injuries (e.g., abrasion, contusion, fracture, sprain) were included. Subjects were screened for independency on activities of daily living. An initial in-person functional, psychological and socio-demographic evaluation was performed and a follow-up interview was done at 3 months to assess outcomes. Outcomes: Functional independence was evaluated with the Older American Resources and Services (OARS) questionnaire. A decrease of 2 or more points was considered indicative of significant functional decline. Unplanned ED visit or hospital admission was secondary outcomes. Data analysis: Descriptive univariate analysis was performed. **Results:** Out of 135 patients enrolled, data were available for 51 with 3 months OARS evaluation. Most patients were between 65 and 84 years old (n = 45 [88.2%]) and half were female. Minor injuries included contusions (62.7%), lacerations (27.4%), sprains (29.4%), fractures (13.7%) and trivial or minor head injuries (19.6%). The mean OARS decrease was 0.529 points (95% CI 0.205–0.854). Eight patients (15.7%, 95% CI 7.0–28.6) had a significant functional decline at 3 months. Ten patients (19.6%) had an unplanned ED visit or hospital admission during follow-up period. A mean decrease of 16.2 points (95% CI 9.2–23.3 points) on the pain scale (0–100) was also observed. **Conclusion:** Independent elders evaluated for minor injuries may have a significant functional decline on short-term follow-up from ED. Tools to identify these "frail" elders and long-term functional evaluations are needed in this population. **Keywords:** geriatrics, minor trauma, functional decline

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RELIABILITY of free-text presenting complaints entered at triage as compared with CEDIS

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Introduction: The Canadian Emergency Department Information System (CEDIS) presenting complaint list was implemented for use in Canada since 2003. However, many Canadian emergency departments (EDs) still rely on free-text entries by triage nurses to generate the reason for visit. The objective of this study was to assess the reliability of free-text entries for presenting complaints written by triage nurses. **Methods:** A total of 78 triage nurses participated in the study; 53 (67.9%) nurses were from an academic teaching centre and 25 (32.1%) were from a small community ED. Sixty-four (83.1%) were female and the participants had a mean (SD) of 8.9 (7.3) years of ED triage experience. Nurses independently assigned free-text presenting complaints for 10 paper-based, case scenarios consisting of vital signs, patient age, pain score and a general description of the reason for visit. Prior to distribution, the questionnaire was peer reviewed and tested for ease of language and comprehension. Kappa statistics were used to measure interrater agreement. **Results:** For the 10 case scenarios analyzed, the free-text presenting complaints matched the CEDIS list 90.1% of the time (κ = 0.80, 95% CI 0.76–0.84). Triage nurses from the teaching hospital had a higher level of agreement with 92.3% of the free-text presenting complaints matching the CEDIS list (κ = 0.85, 95% CI 0.80–0.89;) compared with their colleagues at the community hospital whose free-text entries matched the CEDIS list 85.6% of the time (κ = 0.71, 95% CI 0.63–0.80). **Conclusion:** Free-text presenting complaints appear reliable as compared with the CEDIS list. **Keywords:** CEDIS, free text entries, reliability

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IMPACT of a tertiary pediatric emergency department ambulatory zone on wait times of both high and low acuity patients

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Introduction: Emergency departments (EDs) face pressures to reduce wait times (WTs), yet rarely have additional resources to apply. We postulated that implementing an ambulatory zone (AZ) for low acuity patients would reduce WTs for both high and low acuity patients, as the entire department would benefit from system improvements and efficiencies from parallel processing. **Methods:** Lean techniques were used to identify improvement opportunities throughout our tertiary care pediatric ED (2008 census 53 667). A multidisciplinary team designed, implemented and supported staff through the transition to an AZ model using parallel processing for low acuity patients. Implementation occurred without increased staffing levels or significant modifications to clinical space. Institutional databases and chart audits quantified the impact on median and 90th percentile time-to-MD (TTMD) and total length of stay (TLOS) for high acuity (all admitted + nonadmitted CTAS 1–3) and low acuity (nonadmitted CTAS 4–5) patients, comparing the 6-month period following implementation with the same period the year before. **Results:** The AZ was implemented Jun. 15, 2009, and now manages up to 50% of all patients. Immediate and sustained reduction in WTs across all groups were achieved: median TTMD and TLOS declined for high acuity patients by 22% and 11%, low acuity by 33% and 21%; 90th percentile TTMD & TLOS declined for high acuity patients by 20% and 5%, low acuity by 32% and 20%. On average, high acuity patients saw the MD 18 minutes sooner and stayed 24 minutes less; low acuity patients saw the MD 36 minute sooner and stayed 36 minute less. Secondary benefits of improved patient and staff satisfaction, as well as lower left without being seen rates (2.8%, down from 3.7%) were also achieved. **Conclusion:** Implementation of an AZ in a pediatric ED yields substantial improvements to WTs for all patients, not just low acuity patients served in the zone. These improvements, based on Lean philosophies, were achievable without additional staff or significant redesign. **Keywords:** ambulatory care, ED throughput, Lean management

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A PROSPECTIVE evaluation of the adverse event profile and one-week outcomes of injection drug users undergoing emergency department procedural sedation

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Introduction: Injection drug users (IDUs) may have adverse events (AEs) during procedural sedation and analgesia (PSA) because of complex comorbidities, increased analgesic and sedative requirements, difficult intravenous access and uncertain follow-up. Our objective was to describe AE and 1-week outcomes in this population. **Methods:** As part of a quality assurance audit, IDU status was documented among consecutive patients undergoing PSA from Apr. 1, 2006, to Jan. 31, 2009, in 2 urban Vancouver emergency departments (EDs). Structured data describing comorbidities, sedation regimens, medical treatments and prespecified AEs were collected prospectively. The study cohort was probabilistically linked to a regional administrative database to identify all patient visits to any regional ED within 7 days, and to the provincial vital statistics database to record all deaths within 7 days. Our primary outcome was the number of PSA-related AE. Secondary outcomes included deaths and 1-week ED revisits and admissions by patients who were discharged at the index encounter. Descriptive methods were used to

analyze data. **Results:** A total of 198 IDU patient procedures were analyzed, with a mean age of 40 (SD 9) years and 57.3% male. Seven sedation-related AEs took place (3.5%, 95% CI 1.0%–6.1%) with none leading to an unplanned admission: 2 episodes of transient apnea, 2 uses of a reversal agent and 3 emergence reactions. A total of 33 patients (16.7%) were admitted. In the following week, no patients died (0%, 95% CI 0%–1.8%) and 60 patients (30.4%) had 108 visits to a regional ED, with 4 admissions. Visits were related to treatment of the index condition, (106, with 2 admissions for clinical deterioration) or a new problem (2 visits both requiring admission for cocaine-related psychosis). **Conclusion:** Procedural sedation appears to be a safe and effective procedure in IDUs. Return ED visits and admissions were related to underlying or new illness rather than complications of PSA. **Keywords:** procedural sedation, injection drug users, adverse events

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EMERGENCY physicians spend half their clinical time away from the bedside: a time motion analysis

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Introduction: Patients are unaware of the scope of their care when assessed in the emergency department (ED). Patients may interpret an emergency physician's (EP's) absence from the bedside as a break in their care. Many tasks important to patient care take place "out of sight" of the patient. We set out to determine the direct contact time between EPs and their patients during an ED encounter. **Methods:** This multisite, interprovincial observational time–motion cohort study was performed at 3 urban EDs. Trained research assistants shadowed EPs during clinical shifts and recorded, to the closest 15 seconds, EP time spent on the history and physical, charting, bedside care, reviewing charts, checking test results, doing procedures, finding reference information, communicating with providers, teaching, giving discharge instructions and completing charts. Total EP time per patient and time on task was analyzed using descriptive methods. **Results:** During the study, 45 EPs were observed over 914 patient encounters; 280 physician hours were time–motion captured in 15 second increments. The mean duration of clinical time spent per patient was 18.3 minutes (95% CI 17.5–19.1). Half (50%) of patient related activities took place away from the bedside (9.0 min/patient, 95% CI 8.54–9.46). The majority of bedside clinical time (62.4%) was spent on history and physical (5.8 min/patient, 95% CI 5.44–6.16). Discharge instructions were 19.3% of bedside time. Tasks away from the bedside but directly relevant to patient care were (in % of EP time per patient): charting (22.4%), records and test review (9.8%), communicating with health colleagues (9.8%). **Conclusion:** In our study, much of patient care occurs away from the bedside. Future study is warranted to determine if this bedside absenteeism negatively impacts patient perception of ED care. **Keywords:** time–motion analysis, clinical productivity, task times

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EMERGENCY physician time utilization and clinical productivity

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Introduction: Emergency physicians differ in their clinical productivity (patients seen per hour). A physician's speed depends on time spent performing different components of clinical care. Our objective was to determine how "fast" physicians differ from "slow" physicians in their clinical time utilization. If we can identify behaviour patterns associated with greater productivity, we can generate suggestions for modifying clinical practice. **Methods:** In this cross-sectional time–motion study, a research assistant shadowed 22 emergency physicians on clinical shifts and recorded their time on task for the following activities: history and physical exam, charting, bedside care, reviewing old charts, reviewing test results, doing procedures, looking up reference information, communicating with care providers, teaching and providing discharge instructions. Physicians were then stratified into 2 groups based on their known (patients/h) productivity level. Mean time per patient was determined for each physician, and time utilization behaviour was correlated with known clinical productivity (patients/h) data. **Results:** A total of 317 patient encounters were evaluated. Mean time (SD) per patient was 20.5 (12.9) minutes. Faster physicians (quartile 1 and 2) spent 18.4 (11.4) minutes per patient and slower physicians spent 22.7 (14.0) minutes per patient. Slower physicians spent more time on all tasks except bedside care and teaching. The greatest differences were in history taking (30.3%), reviewing tests (36.2%), providing discharge instructions (28.5%) and charting 36.0%). **Conclusion:** Physician behaviours have a substantial impact on clinical productivity. Awareness of factors determining productivity may help physicians modify clinical practice. **Keywords:** time–motion study, clinical productivity, task times

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THE PREVALENCE of hypoglycemia in children with vomiting or decreased oral intake and irritability

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Introduction: Hypoglycemia has been known to complicate gastroenteritis. This is especially true in children under age 5 and those showing signs of neuroglycopenia, such as irritability. We set out to estimate the prevalence of hypoglycemia in children under age 5 presenting to the emergency department with vomiting or decreased oral intake and irritability. We also measured how often emergency physicians followed our institution's hypoglycemia protocol, the suggested workup of hypoglycemic children. Furthermore, we reported if any underlying disorders that could cause hypoglycemia were diagnosed. **Methods:** Children aged 1 month to 5 years old presenting to the emergency department with vomiting (twice or more) or decreased oral intake (> 50% over 24 h) and irritability as part of the history of present illness were enrolled. Capillary blood glucose was obtained at triage. Patients with glucose above 3.0 mmol/L were considered normoglycemic. Patients with glucose 3.0 mmol/L or lower were retriaged (acuity level increased by 1), and sent to a treatment room with the recommendation that the hypoglycemia protocol be applied. **Results:** Of 145 enrolled patients, 2 were hypoglycemic, for an estimated prevalence of 1.4%. The mean capillary blood glucose was 5.4 mmol/L, and the range was 2.8 to 11.8 mmol/L. The average age of participants was 21 months and 48.3% were female. Most were triaged category 4 or 5, and the most common discharge diagnoses were gastroenteritis, viral illness and vomiting NYD. One of 2 hypoglycemic patients had samples collected as per the hypoglycemia protocol. No underlying disorder was uncovered. **Conclusion:** Hypoglycemia is a rare occurrence in all-comers under age 5 with vomiting or decreased oral intake, even with early signs of neuroglycopenia. Measuring the capillary glucose is better left to the discretion of the physician then as part of triage. **Keywords:** hypoglycemia, gastroenteritis, pediatric emergency medicine

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VALIDATION of a Web-based, real-time electronic notification system to identify potentially eligible subjects for emergency department research studies

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Introduction: Patient identification for research is a challenging task in a busy ED. We developed and validated a real-time instant notification system that identifies potentially eligible subjects based on chief complaint data entered at ED registration. **Methods:** We designed an

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SQL-based system to send instant notifications (email and pager) to study personnel when the terms "chest pain," "chest," "CP," "pressure" or "angina" were entered at ED registration. We validated the system by comparing the classification performance of the notification system with the current standard of identifying research subjects in our ED (screening for patients in real time and manually reviewing an electronic log of patient visits). We assessed system performance in a prospective cohort study conducted in an academic ED over a period of 3 consecutive months. Patients over 24 years of age presenting to the ED with a chief complaint of chest pain were potentially eligible. Patients were enrolled 16 hours a day, 5 days a week. We calculated estimates of sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) by 2 × 2 contingency table analysis. **Results:** From Apr. 1, 2009, to Jul. 1, 2009, there were 14 519 patient visits. There were 551 potentially eligible and 13 726 ineligible subjects. Electronic notifications were generated for 539 of 551 (97.8%) potentially eligible subjects and 244 of 13 724 (1.8%) ineligible subjects. The classification performance of the electronic notification system was: sensitivity 97.8% (95% CI 96.1–98.8), specificity 98.3% (98.0–98.5), PPV 68.8% (65.4–72.9), NPV 99.9% (99.8–100.0). **Conclusion:** We developed and validated an electronic notification system that is highly sensitive and specific for potentially eligible subjects with chest pain. Electronic notification using data entered at ED registration is an accurate and efficient alternative to conventional Methods of patient identification for ED research studies. **Keywords:** research methods, study screening, EDIS.

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THE IMPACT of a triage liaison physician on ED overcrowding: a systematic review

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Introduction: Various interventions have been proposed to reduce emergency department (ED) overcrowding. The use of a triage liaison physician (TLP) has been identified as a potentially effective intervention. This study evaluated the evidence for the effectiveness of TLP. **Methods:** Electronic databases (Cochrane Central Register of Controlled Trials, MEDLINE, Embase, Web of Science, HealthSTAR, Dissertation Abstracts, ABI/INFORM Global), controlled trial registry websites, conference proceedings, study references, experts in the field and correspondence with authors were used to identify potentially relevant TLP studies. Interventional studies in which TLP was used to influence ED overcrowding metrics (length of stay [LOS], left without being seen [LWBS]) were included in the review. Two reviewers independently assessed the citation relevance, inclusion and study quality. Weighted mean differences (WMDs) were calculated and reported with corresponding 95% confidence intervals (CIs). **Results:** From 14 716 potential relevant studies, 29 were included in the systematic review. Only 12 were journal publications, 14 were abstracts and 3 were Web-based articles. Most studies were conducted in the United States; however, the United Kingdom, Canada, Australia and Asia were represented. Only 3 studies were rated as strong due to their study design and the majority of studies employed before–after designs. Fifteen of the 17 studies that reported ED LOS concluded that TLP resulted in shorter LOS. Only 4 studies provided sufficient data to demonstrate this (WMD 23.1 min; 95% CI 21.3–24.9). From 7 of 10 studies providing sufficient data, TLP reduced LWBS (OR 0.53, 95% CI 0.43–0.67). **Conclusion:** The systematic review identified consistent results, albeit from variable methodologies, indicating that TLP is an effective intervention to reduce ED overcrowding. The lack of a formal economic evaluation suggests that further research is required. **Keywords:** triage liaison physician, emergency crowding, systematic review

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CAN I SCRAP the CT chest? The derivation of a CDR to rule out major thoracic injury in major blunt trauma

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Introduction: To derive a clinical decision rule that will rule out major thoracic injury in adult blunt trauma patients, reducing the use of CT chest scans. **Methods:** Data were retrospectively obtained from a chart review of all trauma patients presenting to a Canadian tertiary trauma care centre from 2005 to 2008, excluding those from April 2006 to March 2007 who were to be used for the validation phase. Patients were included if they had a CT chest at admission or had a documented major thoracic injury noted in the trauma database. Patients with penetrating injury or GCS less than 9 were excluded. Three data collectors ($\kappa = 0.83$) collected 28 data points, which were then analyzed for their predictive value. The data was analyzed using basic statistics and logistic regression. **Results:** There were 434 patients that met inclusion criteria. The average ISS in this group was 23. Of the variables collected, 5 were found to be particularly predictive of injury, and when none of these variables were present, no patients had major thoracic injury (Sens 100% [98%–100%], Spec 46.9% [39.0%–54.9%], NPV 100% [93.9%–100%]. The 5 variables used were abnormal chest XR, abnormal thorax palpation, abnormal chest auscultation, abnormal oxygen saturation [defined as < 95% on RA or < 98% on oxygen] and respiratory rate greater than 24. **Conclusion:** In major blunt trauma with a GCS greater than 8, it appears that the 5 SCRAP variables can effectively rule out major thoracic injury. The use of the SCRAP rule in this study would have prevented 46.7% (75/160) of the negative CT scans without missing any major injuries. The next step will be to validate the results of this study within a similar population. **Keywords:** blunt thoracic trauma, CT chest, clinical prediction rule

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STRATIFIED, urgent care for transient ischemic attack results in low stroke rates

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Introduction: Transient ischemic attack (TIA) is a marker for early risk of stroke. The ABCD2 score permits identification of those patients at highest risk. No previous studies have assessed urgent stroke prevention clinics for emergency department (ED) patients with TIA. We hypothesized that an ABCD2-based triaging tool for TIA with outpatient management would be associated with lower 90-day stroke rate than predicted by ABCD2. **Methods:** Between January 2007 and April 2009, we prospectively identified and followed a cohort of patients presenting with symptoms suggestive of TIA to 2 tertiary-care EDs (total census 120 000). Patients were divided into 3 strata based on their ACBD2 score and triage targets were set for each stratum. All patients received the same standard of care in the stroke clinic regardless of their risk score. Primary outcome was stroke by 90 days of index TIA. Secondary outcomes were subsequent TIA, myocardial infarction (MI) or death. Outcomes were assessed using a validated, standardized telephone questionnaire and medical record review. If the subsequent outcome was confirmed by a neurologist, it was deemed a subsequent event. Other possible outcomes were adjudicated by a 3 physician committee blinded to the data collection form and ABCD2 score. **Results:** Of the 1093 patients who met our inclusion criteria, 982 had 90-day follow-up and formed the final cohort. Mean age was 67 (SD 15), 51% were male, 59% had hypertension, and 61% had symptoms for greater than 1 hour. After stratification, 32%, 49% and 19% of patients were categorized as low,

moderate or high risk respectively. The overall 90-day risk of stroke in all patients was 3.2% compared with the ABCD2 predicted risk of 9.2%. Only 6.0% of enrolled patients were admitted. The risk of subsequent TIA, MI or death by 90 days was 5.4%, 0.1% 1.8%, respectively. **Conclusion:** Outpatient care in a rapid access stroke prevention clinic using the ABCD2 score for triage, resulted in a low 90-day stroke rate for ED patients with TIA. **Keywords:** transient ischemic attack, stroke prevention, urgent outpatient evaluation

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ACCURACY of the TIMI risk score in emergency department patients with potential acute coronary syndromes: a systematic review and meta-analysis

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Introduction: The thrombolysis in myocardial infarction (TIMI) risk score uses clinical data to predict the short-term risk of acute myocardial infarction, coronary revascularization and death from any cause. We sought to determine the prognostic accuracy of the TIMI risk score in emergency department patients with potential acute coronary syndromes. **Methods:** We searched 5 electronic databases, handsearched reference lists of included studies, and contacted content experts to identify articles for review. We included prospective cohort studies that validated the TIMI risk score in emergency department patients. We performed metaregression to determine whether a linear relationship exists between TIMI risk score and the cumulative incidence of cardiac events. **Results:** We included 9 prospective cohort studies (with a total of 16 054 patients) in our systematic review. Data were available for meta-analysis in 7 of 9 studies. Of patients with a score of zero, 1.9% had a cardiac event within 30 days (sensitivity 97.2%, 95% CI 96.4–97.9; specificity 24.8%, 95% CI 24.1–25.6; positive likelihood ratio 1.29, 95% CI 1.28–1.31; negative likelihood ratio 0.11, 95% CI 0.09–0.15). Metaregression analysis revealed a strong linear relationship between TIMI risk score ($p < 0.001$) and the cumulative incidence of cardiac events. **Conclusion:** Evidence supports use of the TIMI risk score to risk stratify emergency department patients with potential acute coronary syndromes. The lowest risk category (TIMI 0) missed 1.9% of cardiac events. Though the TIMI risk score is an effective risk stratification tool it should not be used as the sole means of determining patient disposition. **Keywords:** acute coronary syndromes, clinical prediction rules, systematic review

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EFFECTIVENESS of procedural sedation for abscess drainage in injection drug users and those who do not use injection drugs: a prospective cohort comparison

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Introduction: Injection drug users (IDUs) may have altered requirements for sedatives and analgesics during procedural sedation and analgesia (PSA) which may increase risk for adverse events (AEs) or prolong length of stay (LOS). We sought to determine if IDU status increased AE or LOS for a cohort of patients undergoing incision and drainage (I & D) for cutaneous abscesses. **Methods:** From Apr. 1, 2006, to Jan. 31, 2009, prospective structured data was obtained on all PSAs in 2 urban Vancouver emergency departments (EDs). Comorbidities (including IDU status), vital signs, ED medications, recovery time, LOS and prespecified AEs, were collected on consecutive patients undergoing I & D. The primary outcome was the number of AEs in each group; secondary outcomes were median recovery times and median ED LOS, stratified by IDU status. **Results:** A total of 286 consecutive patients were enrolled; 166 were active IDUs and 120 non-IDUs. Ages, vital signs and sedation regimens were similar in both groups. There were 5 AEs in the IDU group (2 episodes of transient apnea, 2 emergence reactions and 1 use of a reversal agent) (3.0%, 95% CI 0.4%–5.6%), and 3 in the non-IDU group (2 episodes transient of apnea and 1 use of a reversal agent) (2.5%, 95% CI 0%–5.3%) (for primary outcome, $p = 0.76$). No AEs changed patient disposition. Median recovery time was 25 (IQR 15–49) minutes in the IDU group and 22 (IQR 15–36) minutes in the non-IDU group. ED LOS in nonadmitted patients was 3.6 (IQR 2.7–4.9) hours in the IDU group and 3.7 (IQR 2.9–5.1) hours in the non-IDU group (for secondary outcomes, both $p > 0.8$ by Mann–Whitney U test.) **Conclusion:** Procedural sedation appears to be equally safe in IDUs and non-IDUs. Furthermore, neither sedation times nor ED LOS seem to be affected by IDU status. **Keywords:** procedural sedation, injection drug users, adverse events

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VARIATION in emergency department management of recent-onset atrial fibrillation and flutter (RAFF)

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Introduction: Recent-onset atrial fibrillation and flutter (RAFF) are the most common arrhythmias managed in the ED but there is insufficient evidence to help physicians choose between competing treatment strategies, rate control and rhythm control. We evaluated variation in ED management practices for RAFF patients at multiple Canadian sites. **Methods:** We conducted a multicentre health records review of all adult RAFF cases seen at 8 Canadian university EDs over a 12-month period using a standardized approach to case identification and data abstraction with all cases reviewed centrally. We evaluated site variation for management strategies and conducted logistic regression analysis to control for potential confounders. **Results:** Among 1068 study patients, the presenting rhythm was atrial fibrillation for 88.3% and atrial flutter for 11.7%; 83.3% were discharged home from the ED. Many (59.4%) cases were managed with rhythm control (interhospital range (IHR) 42%–85%, $p < 0.0001$) and of these, electrical cardioversion was attempted first for 44.2% (IHR 7%–69%, $p < 0.0001$). Where rhythm control drugs were used, the most common agents were procainamide 62.1% (IHR 15%–89%, $p < 0.0001$), amiodarone 15.0% and propafenone 8.8%. Adverse events were relatively uncommon and transient for patients undergoing attempts at pharmacological (13.3%) or electrical (13.6%) cardioversion. Of all patients, 30.5% had cardiology consultation in the ED (IHR 16%–64%, $p < 0.0001$). Logistic regression analysis found hospital site to be an independent predictor for attempted rhythm control ($p < 0.001$). **Conclusion:** We demonstrated a high degree of variation among large Canadian EDs in management approaches for RAFF patients. Individual hospital site was a strong independent predictor for the key treatment issue, rhythm control versus rate control. This variation reflects the lack of high quality evidence and supports the need for more clinical research to determine the optimal management for these patients. **Keywords:** atrial fibrillation, practice variation, health records review

Poster presentations

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AN INTERNATIONAL view of how recent-onset atrial fibrillation is treated in the emergency department

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Introduction: This study was conducted to determine ED physicians' practice in managing recent-onset atrial fibrillation (RAF) in various

world regions (Canada, the United States, the United Kingdom and Australasia). **Methods:** We completed a mail and email survey of a random sample of 4 national EP associations. One prenotification letter and 3 survey letters were sent to members of CAEP (Canada), ACEP (United States), CEM (United Kingdom) and ACEM (Australasia) as per the Dillman modified technique. The survey contained 23 questions about management of adult patients with symptomatic RAF (either first detected or paroxysmal-recurrent) where onset is less than 48 hours and cardioversion remains a treatment option. Data were analyzed using descriptive and χ^2 statistics with 95% CIs. **Results:** Response rates were as follows: overall (40.1%); Canada (42.9%), the United States (49.8%), the United Kingdom (37.6%) and Australasia (37.7%). Physician demographics were as follows: 71.5% male, mean age 41 years and mean 11 years' experience. The proportions of physicians attempting rate control are the United States (94.0%), Canada (70.8%), Australasia (61.1%) and the United Kingdom (43.6%) ($p < 0.0001$). Diltiazem is used for rate control in Canada (65.2%) and the United States (94.7%), while metoprolol is used in Australasia (67.6%) and the United Kingdom (65.5%). Cardioversion is attempted in Canada (65.6%), Australasia (49.4%), the United Kingdom (49.1%) and the United States (25.3%) ($p < 0.0001$). Pharmacological cardioversion is attempted first in all regions with the preferred drug being procainamide in Canada (56.7%) and amiodarone in Australasia (62.8%), the United Kingdom (45.5%) and the United States (38.8%) ($p < 0.0001$). If drugs fail, electrical cardioversion is then attempted in Canada (90.1%), Australasia (75.6%), the United Kingdom (52.0%) and the United States (46.3%) ($p < 0.0001$). **Conclusion:** ED practice for treatment of RAF is extremely varied among regions, most markedly for use of rate versus rhythm control, drug choice for rate control and pharmacological cardioversion, and use of electrical cardioversion. These differences demonstrate the need for better evidence to guide ED management of this common dysrhythmia. **Keywords:** atrial fibrillation, practice variability, survey research

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INTRA-articular lidocaine versus intravenous sedation for the reduction of anterior shoulder dislocations in the emergency department.

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Introduction: Intravenous sedation (IVS) is commonly used to facilitate shoulder reductions in the emergency department (ED). Studies have suggested that intra-articular lidocaine (IAL) injection may be an effective alternative method. The objectives were to compare the rate of successful closed reductions, ED length of stay, patient satisfaction and complications when IAL was used compared with IVS for the reduction of an acute, anterior shoulder dislocation in the ED. **Methods:** This prospective, randomized trial included patients aged 16 years or older presenting to an academic ED requiring closed reduction for an acute anterior shoulder dislocation. Randomization was concealed from physicians, nurses and patients using sealed, opaque envelopes. Patients in the IAL group received 4 mg/kg (up to 200 mg) of 1% lidocaine injected into the glenohumeral joint using a lateral approach. Patients in the IVS group received sedation medications and dosing as per the discretion of the treating physician. All patients were followed up within 2 weeks of the ED visit to determine if there were any postreduction complications. **Results:** A total of 41 patients (22 IAL, 19 IVS) were enrolled. Mean (SD) age was 37.1 (19.2) years and 33 (80.5%) were male. There was a lower rate ($p < 0.001$) of successful closed reduction in the IAL group (11, 50%) as compared with the IVS group (19, 100%). Mean (SD) time from first physician assessment to discharge was 189.5 (120.3) minutes in the IAL group; which was not statistically different from 172.2 (82.6) minutes in the IVS group ($p = 0.59$). There was no difference in patient satisfaction between the 2 groups ($p = 0.08$). No complications were reported in either group at time of reduction or follow-up. **Conclusion:** Previous studies have shown success rates with IAL similar to those with IV. Our study did not support this with physicians recording inadequate analgesia most commonly as the reason for failure of IAL. **Keywords:** intra-articular lidocaine, shoulder dislocation, randomized controlled trial

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ISOLATED dysarthria is a strong predictor of early recurrent stroke

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Introduction: Isolated dysarthria is a rare presentation for transient ischemic attack (TIA). Published case series estimate its occurrence in less than 1.5% of confirmed strokes. Given the broad differential diagnosis, this presentation has an unknown prognosis as there have been no published reports describing its natural history. The objective of this study was to prospectively identify and follow a cohort of patients with acute onset isolated dysarthria, and to establish early stroke risk. **Methods:** This prospective multicentre cohort study identified and followed a cohort of patients diagnosed by emergency physicians with TIA at 8 Canadian EDs between October 2006 and April 2009. Inclusion criteria were age 18 years or older and final emergency physician diagnosis of TIA/minor stroke, and exclusion criteria were onset greater than 1 week, decreased level of consciousness and an established nonvascular etiology for symptoms. Primary outcomes were stroke, TIA or vascular death at 90 days. Outcomes were assessed by clinical follow-up, medical record review and/or a validated standardized telephone interview, and adjudicated by a 3 physician committee, blinded to the original ED visit and physician data collection form. **Results:** A total of 1765 patients met inclusion criteria; 1514 had 90-day follow-up and formed the final cohort. A total of 43 patients presented with isolated acute-onset dysarthria (2.8%). Of these, 6 (14%) had recurrent stroke within 90 days. Three strokes occurred within 2 days, 1 within 7 days, 1 within 30 days and the last within 90 days. There was 1 recurrent TIA but no vascular deaths within 90 days. Median ABCD2 score for the isolated dysarthria cohort was 5, which predicted a maximal 90-day stroke rate of 9.8%, based on published literature. **Conclusion:** We present the first prospective cohort of patients with acute-onset isolated dysarthria, and demonstrate a very high 90-day recurrent stroke rate. This rare clinical presentation is at high-risk for stroke and requires appropriate urgent management. **Keywords:** transient ischemic attack, dysarthria, ischemic stroke

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H1N1 presentations in the emergency department: What are the early indicators?

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Introduction: Early diagnosis of H1N1 is paramount for treatment and prevention of transmission of the virus in emergency departments (EDs). Implementation of effective early screening strategies would facilitate management and improve ED operations. This study aims to identify patient characteristics early in the ED visit (pretriage and triage) associated with H1N1. **Methods:** Retrospective cohort study conducted in a tertiary teaching hospital. Eligible patients presented to the ED from May 1 to Nov. 18 and had a nasopharyngeal aspirate (NPA). NPAs for hospital admission were excluded. Data (demographic, presenting day, symptoms at pretriage and triage, CTAS, arrival mode, diagnosis, admission, length of stay [LOS] in

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hours, NPA result) were extracted from electronic databases. Pretriage symptoms of cough, fever, shortness of breath or sore throat were labelled as positive pretriage (PPT). Medians (interquartile range) and proportions were used to describe H1N1 positive and H1N1 negative patients. Logistic regression (OR, 95% CI) was applied in identifying patients factors. **Results:** In total, 1051 visits with NPA tests were collected among which 311 (29.6%) were H1N1 positive. Comparing H1N1 positive with H1N1 negative, the median ED LOS is 5.6 (3.3–10.8) versus 8.6 (4.2–26.9) with $p < 0.0001$, the median delay (h) from arrival to test received 3.8 (2.0–7.5) versus 4.7 (2.3–10.2) with $p = 0.003$, admission = 10% versus 26% ($p < 0.0001$). Factors associated with an increased risk of H1N1 positive (OR, 95% CI) were, younger age (by decade [1.45, 1.33–1.59]), PPT (2.3, 1.7–3.1), fever and/or cough at triage (1.8, 1.4–2.4) or weekend visit (1.5, 1.1–2.1). **Conclusion:** The factors associated with H1N1 are PPT, fever and/or cough at triage, younger age and weekend presentation. These characteristics increase the risk of H1N1 and can serve as indicators in early screening. **Keywords:** H1N1, pretriage, syndromic surveillance

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USE of simulation in Canadian FRCP EM residency training programs

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Introduction: There is evidence that simulation-based curricula lead to improved knowledge acquisition and retention, enhanced communication and teamwork skills, and even improved patient outcomes. A survey of American EM residency training programs showed a 3-fold growth in the use of simulation by EM residency programs from 2003 to 2008. No data are currently available on the use of simulation in Canadian EM residency programs. Our objective was to evaluate the use of simulation in Canadian FRCP EM residency training programs. **Methods:** We distributed a 12-question online survey which addressed the following areas: 1) overall usage, 2) use of different modalities, 3) access to equipment/facilities, 4) educational goals and 5) barriers to use of simulation. The survey was sent to all FRCP EM program directors. **Results:** All 13 programs responded (100% response rate). All programs report either owning, operating or having access to a dedicated simulation training facility. Of the programs, 46.2% own mannequin-based hi-fidelity simulators, 69.2% own partial task trainers and 38.5% do not own any simulation equipment. (All programs that do not own simulation equipment state their residents receive simulation training elsewhere.) Of the programs, 38.5% use simulation greater than 20 hours per year. Resuscitation skills (100%) and teamwork/communication (92.3%) are the main educational goals of simulation training, while professionalism (38.5%) and error avoidance (30.8%) are taught less frequently in a simulated environment. Only 38.5% of programs are using simulation as a replacement for didactic learning. The major perceived barrier to use of simulation was faculty time (69.2%). **Conclusion:** Of FRCP EM programs in the country, 100% are using simulation to train their residents, but less than half own a hi-fidelity simulator. Simulation is underutilized with most programs focusing on resuscitation and communication skills and few substituting simulation for didactic learning or using it in areas such as professionalism and error avoidance. **Keywords:** simulation training, residency training, survey study

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USING a didactic lecture and live field simulation to teach disaster medicine to emergency medicine residents

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Introduction: Emergency medicine (EM) physicians provide clinical care and leadership in disaster situations. Educational credentialing bodies (e.g., Royal College of Physicians and Surgeons of Canada [RCPSC]) require EM residents to demonstrate competence related to disaster medicine (DM). However, there is no widely adopted curriculum. The purpose of this study is to evaluate the effectiveness, measured by participant satisfaction and knowledge acquisition, of a novel DM curriculum. **Methods:** This was a before–after, single-cohort, repeated-measures design using a convenience sample of EM residents. Institutional ethics approval was granted. The curriculum was designed based on a literature review and consultations with DM and education experts. Instructional methods consisted of the following: didactic lecture, video module, participation in a single high-fidelity simulated exercise and a debriefing session. Learners were assessed using a short-answer question exam, evaluating knowledge of DM before and 6 weeks after the curriculum. A questionnaire was administered regarding self-perception of knowledge change and curriculum satisfaction. **Results:** Twenty-eight residents participated (68% RCPSC training stream); 58% were senior residents. Independent scoring of the exam was very reliable (intraclass correlation = 0.998). The mean difference in DM knowledge between pre- and 6-week postcurriculum was 27.67 (95% CI 22.65–32.71; paired t test = 11.90, df 27, $p < 0.0001$). This difference indicates a large educational effect (Cohen d = 3.07). Of participants, 74% reported mediocre to poor DM knowledge before the curriculum. Greater than 95% agreed or strongly agreed that they learned new knowledge; and an equal percentage felt better prepared for managing a disaster. All participants agreed or strongly agreed to recommend the course to peers. Finally, two-thirds agreed or strongly agreed that the course encouraged continued DM training. **Conclusion:** A curriculum using didactic lecture, video modules and a single high-fidelity simulation exercise increases EM resident knowledge of DM at 6 weeks. **Keywords:** disaster medicine, high fidelity simulation, education research

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AN EMERGENCY department anaphylaxis order set may increase anaphylaxis guideline compliance

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Introduction: We sought to describe the impact of an emergency department (ED) and ED observation unit (EDOU) order set on the management of patients presenting to the ED with anaphylaxis. **Methods:** An observational cohort study on all patients over 18 years of age presenting to the ED with symptoms of anaphylaxis and allergic reaction based on National Institutes of Allergy and Infectious Diseases/Food Allergy and Anaphylaxis Network (NIAID/FAAN) criteria was conducted between May and November 2009. An ED and EDOU order set was established and made available for physicians to use at their convenience. Data collected on ED management, disposition, follow-up referrals and prescriptions for self-injectable EpiPen (SIE) using a standardized data abstraction form was analyzed using JMP 8 statistics. **Results:** Fifty-nine patients met NIAID/FAAN criteria for anaphylaxis. Median (IQR) age was 39 (28%–56%) years and 34 (57.6%) female. The inciting allergens were insect stings/bites in 12 (20.3%), food in 16 (27.1%), environmental in 8 (13.5%), medications in 7(11.8%), contrast agents in 5 (8.4%) and unknown in 11 (18.6%) patients. The order set was used in 21 (35.5%) patients who were admitted to the EDOU. Among the other 38, 14 (39.4%) were discharged home from ED, 11 (28.9%) admitted to an ICU, 8 (21.0%) to general medicine and 5 (13.1%) to the EDOU. When the protocol was used, higher H2 blocker administration ($p = 0.010$) was observed. After exclusion of iatrogenic causes, order set patients tended to be more likely to receive a prescription for SIE (88.8% v. 62.0%) ($p = 0.044$) and referred for

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allergy follow-up (66.6% v. 34.4%) ($p = 0.031$). **Conclusion:** The use of the emergency medicine order set based on the NIAID/FAAN criteria for anaphylaxis has increased use of H2 blockers, follow-up referral with an allergist and prescription of SIE. The hospital admission rates decreased significantly. A larger prospective study is needed to validate these results. **Keywords:** anaphylaxis, order sets, observation units

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PANIC in emergency department patients with unexplained chest pain

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Introduction: This study aimed at the following: 1) establishing the prevalence of panic attacks (PAs) in emergency department (ED) patients with unexplained chest pain (UCP), 2) describing and comparing the socio-demographic, medical and psychiatric characteristics of patients with and without PAs, 3) measuring the rate of identification of PAs in this population. **Methods:** This prospective, multicentre study focuses on a sample of consecutive ED patients with UCP in 2 academic ED. Patients were eligible to participate if their chest pain remained unexplained at discharge. A structured interview (ADIS-IV) was administered to screen patients for PA and evaluate patients' psychiatric status. Anxious and depressive symptoms were evaluated with self-report questionnaires. Medical information about ED visit and external referrals was extracted from patients' medical records. **Results:** The prevalence of PA in ED patients with UCP ($n = 771$) is 43.9% (95% CI, 40%–48%). Patients with PA were younger (50.3 v. 56.7 yr) and more likely to be female (52.2% v. 43.1%) than those without PA. Psychiatric disorders were more common in PA patients (63.4% v. 36.6%), as were suicidal thoughts (21.3% v. 11.3%). PAs were further associated with more frequent ambulance use (34.4% v. 20.8%). The rate of hospitalization was comparable between patients with and without PA. Finally, emergency physicians' diagnosed only 20.9% of panic cases. **Conclusion:** PAs are common in ED patients with UCP. This condition is rarely diagnosed in this population. The results of this study strongly suggest that PA, a condition associated with significant psychological distress for patients, must be systematically included in the differential diagnosis process for ED patients with UCP. **Keywords:** chest pain, panic disorder, prevalence

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DOES emergency physician disposition decision-making have an impact on adverse events?

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Introduction: One of the most critical, yet poorly understood, decisions that emergency physicians (EPs) make is disposition. We sought to determine how EPs make discharge decisions for high acuity patients and the impact these have on adverse events (adverse outcomes associated with health care management). **Methods:** We conducted a real-time survey of attending staff EPs for all consecutive patients discharged from geographic high acuity areas of a tertiary care emergency department (ED) during enrolment shifts. We excluded decisions about admitted or pediatric patients. This piloted survey used standardized questions about the rationale for EP decisions and the use of specific criteria or evidence. We collected data on patients' initial ED presentation and any subsequent 30-day adverse outcomes (deaths, admissions, ED and clinic visits). Three trained EPs independently reviewed and re-identified case summaries using a structured adverse event review process. Analysis included descriptive statistics and odds ratios. **Results:** We interviewed 32/36 eligible EPs immediately after their disposition decisions for 366 patients (88.9% response rate). The EPs were 71.9% male and experienced (53.1% > 10 years in practice). Half of the patients were male (54.9%) with a mean age of 60. For the majority of encounters, EPs based their decisions on clinical judgment (320/366, 87.4%) while the remainder were based on specific evidence (46/366, 12.6%). There were 69 adverse outcomes (18.9%) and 10 adverse events (2.7%, 95% CI 1.1%–4.4%). All adverse events were deemed preventable. The likelihood of experiencing a preventable adverse event was not associated with decision-making rationale ($p = 0.5824$), gender (OR 4.61, 95% CI 0.55–39.04) or experience (OR 1.72, 95% CI 0.40–7.30). **Conclusion:** Emergency physicians most often rely on clinical acumen rather than evidence-based guidelines when discharging patients from the ED. This approach was not associated with more preventable adverse events. **Keywords:** disposition decision, adverse events, real-time survey

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ARE emergency physicians initiating long-term anticoagulation in discharged patients with atrial fibrillation and high CHADS scores?

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Introduction: Guidelines strongly recommend long-term anticoagulation (AC) with warfarin for patients with newly recognized AF who have high embolic risk by virtue of a CHADS score of 2 or greater. We describe patterns of ED-initiated AC among eligible patients discharged from Canadian centres with an episode of recent-onset atrial fibrillation and flutter (RAFF) and determine if decision-making is driven by the CHADS score or other factors. **Methods:** This substudy of the Canadian RAFF project examined health records using uniform case identification and data abstraction as well as centralized quality control; it was conducted in 8 Canadian university EDs over a 12-month period. Eligible patients for this analysis demonstrated RAFF requiring emergency management, were not already taking warfarin and were not admitted to hospital. Univariate analyses were conducted using t test or χ^2 to select factors associated with anticoagulation initiation at a significance level of $p < 0.15$ and multiple logistic regression was employed to evaluate independent predictors after adjustment for confounders. **Results:** Among 633 eligible patients only 21 of 120 patients (18%) with a CHADS score of 2 or greater received AC and among 70 patients who were given AC only 21 (30%) had a CHADS score of 2 or greater. Independent predictors of AC included age by 10-year strata: (OR 1.7, 95% CI 1.34–2.14), heparin use in the ED (OR 9.6, 95% CI 4.9–18.9), a new prescription for metoprolol (OR 9.6, 95% CI 4.9–18.9) and being referred to cardiology for follow-up (OR 5.6, 95% CI 2.6–12.02). CHADS score of 2 or greater doubled the likelihood of being prescribed AC (OR 2.0, 95% CI 1.5–3.5) but was not an independent predictor. **Conclusion:** Patients discharged from the ED in this study are not prescribed AC in keeping with current recommendations. This practice gap merits further investigation and may benefit from educational efforts or enhanced support for AC use from the ED. **Keywords:** atrial fibrillation, CHADS score, anticoagulation

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IMPACT of medical trainees on the clinical efficiency of attending emergency physicians: a time flow analysis

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Introduction: Time spent teaching may reduce emergency physician (EP) productivity. Conversely, higher-level trainees may expedite

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clinical care and enhance EP efficiency. We set out to determine the impact of trainees on EP time utilization for key clinical activities. **Methods:** This observational time-motion cohort study was performed at 2 urban emergency departments. Trained research assistants shadowed EPs during clinical shifts and recorded, to the closest 15 seconds, their time spent on the data collection, charting, bedside care, reviewing charts, checking test results, doing procedures, finding reference information, communicating with providers, teaching, giving discharge instructions and completing charts. Encounters managed by the EP alone were compared with encounters involving a trainee. Total EP time per patient and time on task was analyzed using descriptive methods. **Results:** During the study, 23 EPs working with 11 trainees were observed during 319 patient encounters. Of these, 218 patients (68.3%) were managed by the EP alone, 58 (18.2%) by EP and resident, and 53 (16.6%) by EP and medical student. There were no significant differences in patient age, acuity or complexity in the 3 groups. Clinical time per patient increased for EP working with medical students compared with EP working alone (26.0 v. 20.1 min, $p < 0.05$). There was a trend toward more efficient patient care for EPs working with residents versus EPs working alone (16.9 v. 20.1 min, $p = 0.07$). Time spent on data collection was shorter when working with a trainee ($p < 0.05$). Physicians spent an average of 3.7 minutes per patient teaching residents and 2.8 minutes per patient teaching students. **Conclusion:** In this setting, students increased EP time per patient by 5.9 minutes (29.4%) while residents reduced EP time per patient by 3.2 minutes (15.9%). Overall, trainees have a negative impact on EP productivity but this may be less substantial than generally assumed, and appears to be correlated to learner level of training. **Keywords:** clinical efficiency, emergency crowding, trainee impact

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CPR and AED training in schools: "Is anyone learning how to save a life?"

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Introduction: Education and training in CPR and AED use in schools may increase citizen bystander rates and improve survival 10-fold. The objective of this study was to determine the rates of CPR and AED training for staff and students across all secondary schools in a major city where 22 cardiac arrests occurred in schools in 2008 and bystanders did CPR in 36% and applied the AED in 9%. Secondary objectives were to identify barriers to training, training techniques, factors associated with school preparedness for cardiac arrest and to explore the relationship of socio-economic status with these factors. **Methods:** Data was collected through telephone interviews of key school staff knowledgeable about CPR and AED instruction following the Dillman telephone methodology. Interviewers employed a Web-based tool with investigator oversight, built-in logic and range checks to standardize data collection. Verbal consent was obtained. **Results:** Student population ranged from 5 to 2100. Of 271 schools contacted, key school staff were available for interview in 185 schools (68%) and 166 consented to participate (90%). Students and staff were trained in CPR in 77% and 83% of schools, respectively. AED training was 7% for students and 49% for staff. About half the schools had at least 1 AED installed on campus (49%) but 26% were unaware if their AED was registered with emergency services dispatch. Lack of funding and school population were common barriers to teaching. Frequently employed training techniques were interactive training (31%), didactic instruction (29%) and printed material (15%). **Conclusion:** Training rates in CPR for staff and students were moderate; however, training rates in AED use for both groups were poor. Less than 50% of schools had an AED. Identified barriers to training may be overcome with the use of alternatives, such as DVD-based self-instruction videos with simple low cost mannequins. **Keywords:** CPR training, medical education, survey research

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OUTCOMES in adult patients with traumatic brain injury

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Introduction: Traumatic brain injury (TBI) is a leading cause of death and disability worldwide. There are no recent Canadian data on morbidity or mortality in adults with severe TBI. The primary objective of this study was to determine in-hospital mortality and neurologic outcomes in patients with severe TBI. **Methods:** We studied a prospective cohort of patients from the Ontario Prehospital Advance Life Support (OPALS) Major Trauma Study. Patients were included in the OPALS Major Trauma Study if they were over 16 years of age, had an injury severity score of 12 or greater and were assessed by a paramedic in 1 of 20 participating Ontario communities. We examined the baseline characteristics, prehospital interventions and outcomes in patients with severe TBI (defined as head abbreviated injury score [HAIS] ≥ 4 or GCS ≤ 8 at the scene). Descriptive statistics were used for the primary and secondary outcomes. The outcome assessed were in-hospital mortality, neurologic outcomes (Glasgow Outcome Scale) and in-hospital and ICU length of stay (LOS). **Results:** There were 538 patients with a GCS of 8 or less and 1052 patients with a HAIS of 4 or greater. Of those patients with a GCS of 8 or less, the mean age was 44.3 years and 72.5% were male. Mean injury severity score was 25 and revised trauma score was 4.1. In-hospital mortality rate was 33.3% and 63.1% had a poor neurologic outcome. Mean LOS in ICU was 5.3 days and total hospital LOS was 23.5 days. Of those patients with a HAIS of 4 or greater, mean age was 50.2 and 72.8% were male. Mean injury severity score was 27 and revised trauma score was 6.2. In-hospital mortality rate was 28.4% and 63.5% had a poor neurologic outcome. Mean LOS in ICU was 5.7 days and total hospital LOS was 23.7 days. **Conclusion:** Canadian adult patients that sustain severe TBI experience high in-hospital mortality, poor neurologic outcomes and lengthy hospital stays. Severe TBI should be a priority area of emergency medicine research with respect to prevention, assessment and optimal management. **Keywords:** traumatic brain injury, Glasgow Outcome Scale

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DOES anterior–posterior versus anterior–lateral electrode pad position affect the outcome of cardioversion in tachyarrhythmia? A systematic review and meta-analysis

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Introduction: Electrical cardioversion is commonly used to restore normal sinus rhythm for patients with tachydysrhythmias. The optimal placement of defibrillator pads for cardioversion is unknown. The conventional placement is antero–lateral (AL). However,evidence shows placement of pads antero–posterior (AP) may deliver electricity more effectively. We performed a systematic review to identify RCTs that compared AL versus AP placement for the purpose of electrical cardioversion and conducted a meta-analysis of results from those studies. **Methods:** We searched MEDLINE, Embase, Cochrane Central Register of Controlled Trials, Web of Science and Ovid PubMed to October 2008 for RCTs meeting inclusion criteria. We calculated pooled odds ratios using a Mantel–Haenszel fixed effects model to determine success of cardioversion in each pad position. We assigned each trial a Jadad score to assess for methodological bias and used a funnel plot to assess publication bias. **Results:** We analyzed results from 8 randomized controlled trials involving 1161 participants. Six studies used a crossover strategy; patients received initial shocks with either the AL or AP placement. If unsuccessful, patients received a single crossover shock with pads in the alternate position. Analysis of trials using complete

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protocols showed no statistical significance (OR 1.36, 95% CI 0.89–2.10, $p = 0.16$). Analysis using protocols before crossover showed no statistical significance (OR 0.91, 95% CI 0.64–1.28, $p = 0.58$). Analysis examining all shocks in AP versus all shocks in AL positions showed no statistical superiority (OR 0.94, 95% CI 0.70–1.26, $p = 0.66$). However, the 2 highest weighted trials that accounted for 409 patients both found AP pad placement more successful in converting patients to NSR compared with AL placement (OR 2.24, 95% CI 1.22–4.11) **Conclusion:** Our analysis indicates there is no difference between AL and AP electrode positions for obtaining NSR for patients with atrial fibrillation. However, the 2 highest weighted trials in the analysis did favour AP over AL. **Keywords:** electrical cardioversion, electrode pad positioning, systematic review

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COMPARISON of Canadian versus US emergency department visits and admission rates for acute exacerbations of chronic obstructive pulmonary disease.

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Introduction: Chronic obstructive pulmonary disease (COPD) is a growing health concern worldwide, and emergency department (ED) visits for acute exacerbations of COPD (AECOPD) are common. We describe the first population-based comparisons of admission rates for AECOPD between Canadian and US EDs. **Methods:** Administrative databases in both countries were used to compare AECOPD presentations. Data on all ED and AECOPD visits were available from the Alberta Ambulatory Care Classification System during 6 fiscal years (April 1999–March 2005). US data were available from the NHAMCS data, for which we focused on 1999–2005 and midwestern EDs to improve comparability with the Canadian data. Data included demographics, ED length of stay (LOS) and disposition; all data were coded by trained medical records nosologists. Data analysis included descriptive summaries and population rates (per 100 000 population aged ≥ 55 yr). **Results:** In Alberta, there were 41 884 visits for AECOPD over 6 years. The population rate was 12 ED visits per 100 000 and remained relatively stable over the study period. Median patient age was 73 years and 56% were male. Median ED LOS was higher in large urban centres than other health regions (6 v. 2 h, respectively). Overall, 43% were admitted; 1.2% went to ICU and 0.1% died. In the midwestern United States, participating EDs contributed data for AECOPD representing 908 000 visits. The population rate was 20 ED visits per 100 000 population. Median patient age was 73 years and 53% were male. Median ED LOS was higher in urban versus nonurban EDs (2.6 v. 1.8 h, respectively). Overall, 67% were admitted; 8.5% went to ICU and less than 1% died. **Conclusion:** AECOPD is a common presenting problem in North American EDs. Compared with the United States, Canada has lower population rates of ED visits for AECOPD. Canadian ED visits for AECOPD are several hours longer and less likely to result in hospital admission. Further exploration of these findings appears warranted. **Keywords:** COPD, comparative effectiveness, Canada–US comparisons

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THE IMPACT of the H1N1 second wave on ED left without being seen and 72-hour revisit rates in an urban Canadian region

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Introduction: During the second wave of the 2009 H1N1 influenza pandemic, emergency department (ED) patient volumes in Alberta rose. In addition to the normal ED presentations, many patients presented with influenza-like illnesses (ILI). This study evaluated the impact of this sudden volume surge on the incidence of patients leaving without being seen (LWBS) and 72-hour revisits (RV). **Methods:** LWBS and RV events were collected from the regional ED information (EDIS) database for a 3-month period in 2009 (presurge: Sep. 15–Oct. 16, surge: Oct. 17–Nov. 11, postsurge: Nov. 12–Dec. 15) and compared with the events during the same period in 2008. The LWBS and RV proportions were analyzed by their ILI screening result (ILI positive, ILI negative and ILI not documented) and by their Canadian Emergency Department Triage and Acuity Scale (CTAS) score. **Results:** Daily ED volumes increased by 18.3% (range 2%–43%) during the H1N1 surge. LWBS increased from 6.2% presurge to 8.8% (peaked at 11.6%) and dropped to 5.0% postsurge, which differed from the 2008 rates of 8.4%, 7.6% and 6.9%, respectively. The surge LWBS of 8.8% was higher than 7.6% in 2008 ($p < 0.001$). Of the 2009 LWBS, 19.9% were ILI positive, 42.6% were ILI negative and 37.4% had no ILI status documented. The CTAS score breakdown was 0% CTAS-1, 4.9% CTAS-2, 50.0% CTAS-3, 37.1% CTAS-4 and 7.9% CTAS-5. The RV and RV admission rates were 10.3% and 0.8% in 2008, 9.9% and 0.5% presurge, 7.6% and 0.4% surge, and 10.2% and 0.6% postsurge in 2009, respectively. **Conclusion:** During the 2009 H1N1 pandemic at 8 Edmonton Zone EDs, LWBS peaked during the surge while 72-hour RV and outcomes were similar to 2008 rates. The absence of a larger increase during the surge suggests that patients have lower expectations for care in times of crisis and are reluctant to return once seen in the ED. **Keywords:** H1N1, LWBS, revisit rates

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AIRWAY management and ALS paramedics: difficult airway skills measured before and after an intense airway management training course

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Introduction: Airway management is a high acuity, time-sensitive intervention with significant impact on patient safety and outcome. Recent literature has questioned the role of prehospital endotracheal intubation, citing poor success rates and negative outcomes. Focused education for paramedics may lead to improvement in these areas. This before-and-after study assessed the performance of ground ambulance advanced life support (ALS) (intermediate, advanced and critical care) paramedics in airway management. **Methods:** An intensive airway course, previously taught to physicians, was delivered to all registered ALS paramedics as part of the scheduled inservice. ALS paramedics participated in an objectively scored clinical evaluation (OSCE) at the beginning and end of a 10-hour airway management course. The OSCE was a difficult airway scenario requiring the paramedic to attempt several manoeuvres to improve bag-mask ventilation and view during laryngoscopy. A 12-point checklist was used; 0 points were awarded for no attempt, 1 point for incomplete attempt and 2 points for proper attempt for each manoeuvre. The OSCE ended on successful intubation or at 5 minutes. Sample size required was 41 subjects, assuming an improvement of 3 points was significant. Results were analyzed using a paired t test. Results of a written exam and confidence survey are discussed separately. **Results:** Sixty-three paramedics volunteered to participate. The mean precourse OSCE score was 12.29 (51.2%) of a possible 24 points, and the mean postcourse was 18.32 (76.3%) for an improvement of 6.03 (95% CI 4.83–7.24) points postcourse. **Conclusion:** Significant improvement in simulation performance was found among paramedics who participated in an intense 10-hour airway course. This should have implications for real-world airway management success and decision-making. Future research includes assessment of skill retention over time, validation of the OSCE checklist, and assessment of actual intubation

success improvement in this system. **Keywords:** airway management, paramedic training, educational research

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THE IMPACT of observation units on ED overcrowding: a systematic review

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Introduction: Effective, efficient and sensible interventions are urgently needed to reduce emergency department (ED) overcrowding. The use of observation units (OUs) has been identified as a potentially effective intervention; however, the evidence for decision-makers is limited. The aim of this study was to evaluate the evidence for OUs and their influence on ED overcrowding. **Methods:** Electronic databases (Cochrane Central Register of Controlled Trials, MEDLINE, Embase, Web of Science, HealthSTAR, Dissertation Abstracts, ABI/INFORM Global), controlled trial registry websites, conference proceedings, study references, experts in the field and correspondence with authors were used to identify potentially relevant TLP studies. Interventional studies in which OU was used to influence ED overcrowding metrics (length of stay [LOS], left without being seen [LWBS]) were included in the review. Two reviewers independently assessed the citation relevance inclusion and study quality. Weighted mean differences were calculated and reported with corresponding 95% confidence intervals (CIs). **Results:** From 14 716 potentially relevant studies, 7 OU studies were included. Three were journal publications and 4 were abstracts. Five trials were conducted in the United States and all were single-centred ED studies. The quality of all 7 studies was rated as weak due to poorly described methods and use of nonrandomized controlled designs. Only 1 study was a comparative cohort design and all others were before–after designs. Three studies reported ED LOS outcomes and concluded that the OU resulted in shorter stays compared with the control group (median = 35 min). OU reduced LWBS (n = 2, OR = 0.62, 95% CI 0.50–0.76) compared with the control period. **Conclusion:** The available evidence on OUs is limited by small numbers of studies, poor methodologies and incomplete reporting. It is unclear at this point whether the efforts required to establish an OU are rewarded with sufficient improvements in ED overcrowding. **Keywords:** emergency crowding, observation units, systematic review

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THE IMPACT of full capacity protocols on ED overcrowding: a systematic review

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Introduction: Full capacity protocols (FCP) have been proposed as a potential solution to emergency department (ED) overcrowding. The aim of this study was to assess the available evidence for FCP and its influence on ED overcrowding. **Methods:** Electronic databases (Cochrane Central Register of Controlled Trials, MEDLINE, Embase, Web of Science, HealthSTAR, Dissertation Abstracts, ABI/INFORM Global), controlled trial registry websites, conference proceedings, study references, experts in the field and correspondence with authors were used to identify potentially relevant FCP studies. Interventional studies in which FCP was used to influence ED overcrowding metrics (length of stay [LOS], left without being seen [LWBS]) were included in the review as single programs or part of a system-wide intervention (SWI). Two reviewers independently assessed the citation relevance inclusion, and study quality; because of limited data, pooling was not undertaken. **Results:** From 14 716 potential relevant studies, 2 were included in the systematic review. Both studies were published as abstracts, arising from the same set of data but reporting different outcomes. Both were single-centred ED studies using before–after designs. The 2 studies were rated as weak due to poorly reported methods. Overall, 1 study reported that FCP resulted in less ED LOS compared with the control group. Another study found FCP decreased ED and hospital access block. In addition, there were 29 SWIs identified from the search, of which 4 contained a FCP component. The triggers, format and implementation of FCP protocols varied widely. **Conclusion:** While this may be a promising alternative for overcrowded EDs, the available evidence to implement FCP interventions is lacking. Additional efforts are required to report FCP interventions using high quality research methods. **Keywords:** emergency crowding, full capacity protocols, systematic review

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TRENDS in the epidemiology of acetaminophen overdose in the United States: a population-based study

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Introduction: Data from both Canada and the United States (US) suggest that hospitalizations for unintentional acetaminophen overdose (AO) are increasing. We sought to examine trends in the epidemiology of AO and identify risk factors for its occurrence using a population-based approach. **Methods:** We analyzed the US Nationwide Inpatient Sample (NIS) database between 1993 and 2007 to identify adult patients hospitalized with a primary diagnosis of AO. The primary outcome measure was the number of AO hospitalizations. Secondary outcomes included hospitalizations for acute liver injury (ALI) and acute liver failure (ALF) (defined using validated coding algorithms), liver transplantations (LT), total length of hospital stay (LOS), hospital charges and in-hospital mortality. Average annual growth rates in outcomes were calculated using Poisson and linear regression models with age- and/or sex-adjustment to the US population. **Results:** Between 1993 and 2007, there were 79 833 hospitalizations for AO; 71% were intentional. Patients with intentional AO were younger, more often female, less likely to have underlying liver disease, and had lower in-hospital mortality and median hospital charges compared with those with unintentional AO. The overall age-/sex-adjusted AO hospitalization rate increased from 11.2 per 100 000 in 1993 to 17.8 per 100 000 in 2007, corresponding to an average annual growth rate of 2.9%. The increase in growth of unintentional AO was double that of intentional AO (6.0% v. 3.0% annually). Average annual increases of hospitalizations for AO-related ALI, ALF and LT were 9.4%, 11.3% and 15.2%, respectively. Total LOS, hospital charges and in-hospital deaths increased an average of 3% to 9% annually. **Conclusion:** The burden of hospitalizations for AO, particularly those due to unintentional ingestions and associated with acute liver injury or acute liver failure, has increased in the US during the last 2 decades. These findings support proposed health legislation that would restrict the availability of acetaminophen. **Keywords:** acetaminophen poisoning, population research, liver injury

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PARAMEDIC confidence in clinical care

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Introduction: Paramedics must maintain competence in various clinical areas. The purpose of this survey was to identify paramedics' self-reported confidence to assess and manage various aspects of clinical care. **Methods:** An online survey was sent to all Nova Scotia

ground ambulance paramedics. Survey content included demographics (11 questions) and self-reported confidence on clinical care (63 questions). Data was compiled using 4-point Likert scales. Analysis consisted of descriptive statistics and regression analysis with key independent variables. Overall confidence was calculated and compared with clinical category confidence with 1-sample *t* tests. **Results:** The response rate was 44.8% (416/929). Most respondents were ACP (40.9%, $n = 170$), full-time employees (84.6%, $n = 352$), and 31–40 years old (45.4%, $n = 189$). Higher paramedic level ($p < 0.001$), fewer high acuity calls per month ($p < 0.01$) and younger age ($p < 0.01$) were all related to higher overall confidence; years of experience were not. Paramedics reported higher confidence in the following clinical categories, compared with overall confidence (all $p < 0.001$ unless indicated): airway, environmental and toxicology, neurology ($p < 0.05$), and trauma; but have lower confidence in the following areas: cardiology, pediatrics, obstetrics, respiratory and disasters. Interesting findings include the following: 92.8% of respondents are confident or very confident in airway assessment, and 97.1% are confident or very confident to manage a noncomplicated airway. Of respondents, 98.8% are confident or very confident in their knowledge of symptom relief cardiac drugs. In contrast, 51.9% are somewhat or not very confident in their knowledge of advanced drugs and 51.5% are somewhat or not very confident in reperfusion strategies. Paramedics are not confident to approach next of kin about tissue donation (54.6% stated somewhat or not very confident). **Conclusion:** This survey highlights clinical areas paramedics have high and low confidence. Continuing education should address areas of low confidence. **Keywords:** paramedic training, clinical competence, self-reported confidence

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A PROSPECTIVE assessment of practice pattern variation in the treatment of pediatric gastroenteritis

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Introduction: The objectives were to determine the frequency of intravenous (IV) rehydration administration, ondansetron administration, hospitalization and revisit rates for patients with gastroenteritis. **Methods:** We conducted a prospective cohort study of consecutive children who presented to 11 Canadian emergency departments (EDs). Eligible children were aged 3–48 months and had gastroenteritis (3 watery stools in a 24-hour period within 72 hours before the ED visit). Clinical and historical features were collected via a survey conducted following triage; information regarding investigations, treatments and disposition were abstracted from the medical record; a follow-up call 2 weeks later provided information on future health care visits. **Results:** Of the 694 eligible children, 647 were enrolled. All children had a chart review completed and 455 (69%) participated in the ED interview. Of these 455 patients, 398 (89%) had telephone follow-up. The mean age of all participants was 21 (SD 12) months. The number of children enrolled per site ranged from 24 to 139. Overall, 24% of children were treated with IV rehydration (range per hospital was 7%–80%, $p < 0.001$) and 14% were administered ondansetron (range 0%–38%, $p < 0.001$). No other antiemetics were administered. Logistic regression analysis revealed that the greatest predictor of IV rehydration was a history of bilious emesis (OR 6.9, 95% CI 1.6–29.4). Other predictors included the presence of vomiting in the 48 hours before ED arrival and hospital where care was provided. The hospitalization rate was 5% (range 0%–12%) and varied between institutions ($p = 0.02$). Children who received IV rehydration at the index visit were more likely to see a health care provider in the subsequent 2 weeks (29% v. 19%, $p = 0.04$) and to revisit an ED (20% v. 9%, $p = 0.003$). **Conclusion:** In this cohort, the use of IV rehydration and ondansetron varies dramatically. Use of IV rehydration at the index visit was associated with the colour and presence of vomiting in addition to the site where care was provided. **Keywords:** gastroenteritis, antiemetic therapy, practice variation

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RESIDENTS-as-teachers: a survey of Canadian emergency medicine specialty programs

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Introduction: The ability to teach is a critical component of residency and future practice. This was recognized in 2005 by the Royal College of Physicians and Surgeons of Canada, which incorporated "teaching functions" into many of the CanMEDS competencies. The aim of our study was to evaluate how emergency medicine specialty programs across Canada prepare their residents for roles as teachers and compare these results to other Canadian specialty programs. **Methods:** A 40-item English questionnaire was developed and translated into French. The survey underwent face validity assessment and was approved by the McGill IRB. It was emailed to program directors and secretaries of all Canadian emergency medicine (EM), anesthesia, diagnostic radiology, general surgery, internal medicine, obstetrics and gynecology, pediatrics and psychiatry programs. The survey was broken down into sections addressing demographics, various modalities of teaching residents, and opportunities to comment on recent program changes. **Results:** A total of 12/13 (92%) EM programs and 78/113 (69%) other specialty programs responded. One hundred percent of responding programs incorporated mandatory teaching responsibilities. A total of 4/12 (33%) EM programs reserved formal teaching functions for PGY-3 and above while only 7/78 (9%) of specialty programs did so. The remaining 71/78 (91%) of specialty programs incorporated mandatory teaching functions in all years of residency. A total of 6/12 (50%) EM programs offered rotations in clinical medical education. In comparison, only 11/78 (14%) of other specialty programs offered rotations in clinical medical education. **Conclusion:** Canadian EM programs appear to differ from other Canadian specialty programs in the way that they develop residents-as-teachers. Compared with other specialty programs, a greater proportion of EM programs offer rotations in clinical medical education yet more commonly wait to introduce formal teaching functions later in residency. **Keywords:** residents as teachers, residency training, survey research

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IMPROVING compliance with central venous catheter insertion best practices in the emergency department

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Introduction: Compliance with central line bundles can reduce central venous catheter (CVC) associated infection rates. The objective of the study was to improve compliance with best practices for CVC insertion in the ED. **Methods:** A prospective observational cohort study was performed between November 2006 and January 2009 in 2 EDs of a tertiary referral centre. Observations were conducted by nurses assisting with the procedure using a standardized audit tool. Data were collected for each new site attempted and each new operator. After 1 year of baseline data collection, physicians were trained using Web-based simulation and nurses were empowered to identify a breach and advise the physician so that corrective action could be taken. Compliance data were collected postintervention to measure the effectiveness of the intervention. **Results:** A total of 98 central

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line insertions on 85 patients were observed. CVC insertions were performed by staff physicians (26.5%) or residents (73.5%) from mostly emergency medicine (36.7%). Most insertions were considered emergent (54.1%) or urgent (43.9%). Ultrasound use increased postintervention (24.2% v. 47.7%, $p = 0.02$) and was more likely to be used by ED staff compared with other services (58.3% v. 29%, $p = 0.004$). Postintervention, compliance with all infection control measures improved from 30% to 68.3% ($p < 0.001$). The following were more likely to be performed postintervention: adequate sterile draping (91.5% v. 72.4%, $p = 0.02$), wearing barrier equipment (90% v. 62.1%, $p < 0.001$), assistant wearing barrier equipment (87.3% v. 37.5%, $p < 0.001$). There was no relationship between compliance and the urgency of the procedure, time of day or day of week. **Conclusion:** A significant improvement in compliance with infection control measures during the CVC insertion can be achieved in the ED despite the urgency of the procedure. These findings can have an important impact on preventing CVC-associated bloodstream infections and support patient safety initiatives. **Keywords:** central venous catheter insertion, best practices, patient safety

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RELIABILITY of the Canadian triage and acuity scale: inter-rater and intrarater agreement of nurses from a community and teaching hospital

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Introduction: The Canadian Emergency Department Triage and Acuity Scale (CTAS) is a 5-level triage tool used to determine the priority by which patients should be treated in Canadian emergency departments (EDs). The objective of this study was to determine the interrater and intrarater agreement on CTAS assignment by trained triage nurses. **Methods:** Seventy-eight triage nurses participated in the study; 53 (67.9%) nurses were from a large urban teaching hospital and 25 (32.1%) were from a small community ED. Of participants, 64 (83.1%) were female and they had a mean (SD) of 8.9 (7.3) years of ED triage experience. Nurses independently assigned triage scores to 10 paper-based, case scenarios consisting of vital signs, patient age, pain score and a general description of the reason for visit. Thirty-three participants repeated the same questionnaire 90 days later and intrarater agreement was measured. Kappa statistics were used to measure inter-rater and intrarater agreement. **Results:** For the 10 case scenarios analyzed, exact modal agreement for all 78 nurses was good ($\kappa = 0.70$, 95% CI 0.66–0.74, quadratic-weighted $\kappa = 0.79$). Triage nurses from the community hospital had a higher level of agreement ($\kappa = 0.78$, 95% CI 0.71–0.84, quadratic-weighted $\kappa = 0.84$) compared with their colleagues at the teaching hospital ($\kappa = 0.67$, 95% CI 0.62–0.72, quadratic-weighted $\kappa = 0.77$). Agreement varied by triage level and was highest for CTAS-1 (resuscitation). Intrarater agreement for nurses who repeated the questionnaire was good ($\kappa = 0.74$, 95% CI 0.68–0.80, quadratic-weighted $\kappa = 0.83$). Community triage nurses hospital had a similar level of intra-rater agreement ($\kappa = 0.76$, 95% CI 0.68–0.85, quadratic-weighted $\kappa = 0.84$) compared with their colleagues at the teaching hospital ($\kappa = 0.73$, 95% CI 0.65–0.80, quadratic-weighted $\kappa = 0.83$). **Conclusion:** Reliability of CTAS scoring for these 10 scenarios was relatively good. The study results may be useful to develop educational materials to strengthen reliability and validity for triage scoring. **Keywords:** CTAS, triage, agreement

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A SURVEY of Canadian emergency physicians on utilization of femoral nerve and fascia iliaca compartment blockade for management of midshaft femoral fractures in children

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Introduction: Femoral nerve (FNB) and fascia iliaca compartment blockade (FICB) have been shown to be safe and effective alternatives to systemic analgesia for midshaft femoral fractures presenting to the pediatric emergency department (ED), yet appear to be underused in Canada. No studies exist that describe under what circumstances Canadian pediatric emergency physicians would be willing to undertake these techniques. We surveyed physician members of the Pediatric Emergency Research Canada (PERC) database to explore practice variation in the Canadian setting. **Methods:** English-speaking members of the PERC database were surveyed between October and December 2009 by Web-based questionnaire. The questionnaire was developed and strengthened via content validity exercises before distribution. **Results:** A response rate of 35% ($n = 68$) was attained. Of those surveyed, 24% ($n = 16$) have at least some experience with FNB/FICB; 15% ($n = 10$) have used FNB/FICB within the last 3 years. No adverse events were reported with either technique. Geographical differences were found when comparing those who had experience with FNB/FICB to those who did not ($p = 0.04$). Recent use of either block was also geographically dependent ($p = 0.001$). Barriers to FNB/FICB use included lack of education/training in either FNB/FICB, lack of departmental policy or guidelines and lack of familiarity with current evidence. **Conclusion:** FNB/FICB use in midshaft femoral fractures in children is infrequent. Canadian practice lags behind other settings and locales despite evidence that these techniques are effective alternatives to systemic analgesia. Regional discrepancies exist within Canada and appear to influence willingness to undertake either technique. **Keywords:** femoral nerve block, femoral fractures, pediatric emergency medicine

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COMPLIANCE with CAEP asthma clinical practice guidelines at a tertiary care emergency department

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Introduction: Although evidence-based clinical practice guidelines (CPGs) exist, emergency department (ED) asthma management remains highly variable. Our objective was to comparatively evaluate asthma management at a tertiary care ED with that advised by the Canadian Association of Emergency Physicians (CAEP) asthma CPG. **Methods:** This retrospective study enrolled patients between the ages of 19 and 60 with a prior diagnosis of asthma, who were seen for an acute asthma exacerbation at the Vancouver General Hospital ED in 2008. Standard methodology guidelines for medical record review were followed, including explicitly defined criteria and determination of interrater reliability. Primary outcomes were the proportion of cases with the following: objective assessment of severity using peak expiratory flow (PEF), use of systemic corticosteroids (SCS) in the ED and at discharge, prescription for any inhaled corticosteroids (ICS) and documentation of outpatient follow-up. **Results:** A total of 204 patient encounters were enrolled. Compliance with the CAEP Asthma CPG was as follows: measurement of PEF 90.2% (95% CI 85.3%–93.9%), use of SCS in the ED 64.4% (95% CI 57.3%–71.2%), prescription of SCS 59.1% (95% CI 51.2%–66.7%), prescription of any ICS 51.0% (95% CI 40.8%–61.1%; ICS alone 38.0%, long-acting β-agonist/ICS combination 13.0%), documentation of outpatient follow-up 78.3% (95% CI 71.4%–84.2%). Kappa values for interrater assessment of primary outcomes ranged from 0.93 to 1.00. A logistic regression analysis, performed for secondary purposes, identified no factors associated with ICS prescription and found that moderate severity, any ICS on arrival and number of bronchodilator treatments were significantly associated with SCS prescription. **Conclusion:** This study indicates that discordance exists between asthma management at a tertiary care ED and the CAEP asthma CPG. Further research is warranted to

understand the reasons for this finding. **Keywords:** asthma, guideline compliance, gap analysis

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A COMPARISON of emergency physician time in Ontario emergency departments using different methods of physician remuneration

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Introduction: Emergency physicians (EPs) in Ontario are remunerated for their clinical work either by means of an alternate funding arrangement (AFA) or by means of a fee-for-service (FFS) remuneration method. The objective of this study was to determine the time required for EPs to assess and treat patients in both AFA and FFS emergency departments (EDs). **Methods:** Twenty hospital-based EDs agreed to participate in this study. Data were collected by research assistants who directly observed EPs for entire shifts and recorded the activities of the EP on a moment-by-moment basis. The individual times of all physician activities associated with a given patient were summed to derive a directly observed estimate of EP time required to treat a patient. Treatment time by CTAS was estimated using Kaplan–Meier Survival Analysis. Hospital sites were grouped into 4 categories; FFS, nonacademic AFA, academic AFA and pediatric AFA. **Results:** A total of 17 197 patients were observed in this study over 767 shifts. Mean (95% CI) EP time for FFS, nonacademic AFA, academic AFA and pediatric AFA sites was 54.7 (41.6–66.5), 51.8 (39.6–64.1), 72.2 (61.5–82.8) and 194.7 (117.8–271.5) minutes for CTAS-1; 21.7 (20.3–23.1), 33.0 (29.5–36.6), 38.8 (35.0–42.6) and 47.9 (43.5–52.3) minutes for CTAS-2; 14.8 (14.3–15.2), 23.4 (22.2–24.6), 25.2 (24.1–26.3) and 28.9 (27.5–30.2) minutes for CTAS-3; 10.1 (9.8–10.4), 14.1 (13.5–14.7), 16.2 (15.4–17.0) and 21.3 (20.3–22.3) minutes for CTAS-4 and 7.8 (7.1–8.5), 10.6 (9.6–11.7), 12.8 (10.8–14.9) and 19.7 (16.8–22.6) minutes for CTAS-5. The mean (95% CI) throughput for EDs operating under different remuneration mechanisms was 4.4 (4.2–4.6), 2.9 (2.8–3.1) and 2.3 (2.2–2.4) patients per hour for the FFS, AFA and pediatric AFA sites. **Conclusion:** FFS treatment times were faster ($p < 0.05$) in CTAS categories 2–5, resulting in higher patient throughput than EPs working in AFA hospitals. Patient outcomes and satisfaction were not assessed. **Keywords:** alternative funding arrangement, fee-for-service, fractile response

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IN out-of hospital cardiac arrest patients, does the description of any specific symptoms to the 9-1-1 dispatcher improve accuracy of the diagnosis of cardiac arrest: a systematic review conducted for the C2010 ILCOR Resuscitation Guidelines

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Introduction: We sought to determine if, in adult and pediatric patients with out-of-hospital cardiac arrest, the description of any specific symptoms to the 9-1-1 dispatcher compared with the absence of any specific description, improve accuracy of the diagnosis of cardiac arrest. **Methods:** For this systematic review, we searched 5 electronic databases (including MEDLINE and Embase), a clinical trial registry and the grey literature. We reviewed without restriction all peer-reviewed prospective and retrospective study designs reporting simulated or real dispatcher interaction with callers. Two independent investigators used standardized forms to review papers for inclusion, quality and data extraction. We used κ for selection agreement and report consensus on science. Lack of homogeneity precluded meta-analyses. **Results:** We identified 473 citations; 69 were selected for full evaluation (κ = 0.74) and 21 met all inclusion criteria (κ = 0.57). One before–after trial and 10 descriptive studies using a strategy evaluating consciousness and breathing status to identify cardiac arrest report sensitivity ranging from 38% to 96.9% and specificity ranging from 94.8% to 99.2%. One case–control, 1 before–after and 4 observational studies describe agonal breathing as a significant barrier. Other studies report improved cardiac arrest recognition when inquiring about the following: past history of seizure, victim's age and emotional status of caller, response to painful stimuli, or level of activity. Information spontaneously provided by callers such as facial colour or describing the victim as dead was highly associated with cardiac arrest in a case–control study. **Conclusion:** Dispatchers most commonly use unconsciousness and absence of breathing or abnormal breathing to identify cardiac arrest victims with variable success. This review will inform the 2010 resuscitation guidelines, and suggest that other clinical features should be explored to improve cardiac arrest recognition by 9-1-1 dispatchers. **Keywords:** prehospital dispatch, symptom description, cardiac arrest

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EMERGENCY department syndromic surveillance for pandemic H1N1influenza

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Introduction: Early detection of disease outbreaks is crucial to emergency department preparedness. This study demonstrates the utility of syndromic surveillance for detection of influenza-like illness (ILI) during the 2009/10 H1N1 influenza pandemic and compares a novel linear regression (LM) aberration detection method to traditional cumulative sum (CUSUM) detection. **Methods:** International Classification of Disease (ICD-9) discharge diagnosis data from our emergency department was analyzed from 11/01/08 to 11/01/09. This data was categorized into ILI syndromes and converted to a proportion of illness by dividing by total ED volume for that day. C1 and C2-CUSUM algorithms using a 3 standard deviation threshold (3SD) were used to generate alerts indicating increased ILI activity. Alerts were also generated using LM analysis. This detection algorithms used the last 12 day proportion of ILI before the day of interest. The slope of the line was used to determine an increase in ILI activity by using an alert angle threshold of 18 degrees. Laboratory data was used to estimate the first confirmed cases of influenza during seasonal and pandemic waves. Timeliness to detection was determined by comparing syndromic surveillance alerts to dates of laboratory confirmed influenza. **Results:** C1 and C2 methods failed to alert before the laboratory confirmation of seasonal influenza. LM alerted 5 days before laboratory confirmed seasonal influenza. C1 and C2 methods alerted 11 days before an increase in counts of laboratory confirmed pandemic influenza in spring while LM alerted 12 days before. C1, C2 and LM methods all alerted 13 days before a rise in laboratory confirmed influenza for the fall pandemic wave. **Conclusion:** Syndromic surveillance provides early notification of ILI before a rise in laboratory confirmed influenza during the 2009/10 pandemic. LM detection methods performed better at outbreak detection than CUSUM with a 3SD threshold in some cases. **Keywords:** syndromic surveillance, pandemic influenza, H1N1

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THE EFFECT of a bolus dose of etomidate on hemodynamics: a systematic review

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Introduction: Etomidate is a preferred induction agent in the emergency department. Our objective was to synthesize the available evidence on the effect of etomidate on mean arterial pressure (MAP). **Methods:** We developed a systematic search strategy and applied it

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to 10 electronic bibliographic databases. We hand searched medical journals, conference proceedings, grey literature and bibliographies of relevant literature, and contacted content experts for studies. Studies were included if they reported adult data comparing the effect of etomidate to another rapidly acting intravenous induction agent on blood pressure postinduction. Retrieved articles were reviewed and data were abstracted in duplicate using standardized methods. Data were pooled using the random effects model if at least 4 clinically homogenous studies of the same design reported the same outcome measure. **Results:** Of 3083 studies found, 27 met our inclusion criteria, of which 22 were conducted in elective surgical and 5 in critically ill patients. Four studies on elective surgical patients met criteria for pooling. The results from pooling showed that etomidate caused no drop in the pooled mean MAP postinduction. However, barbiturates (–9.2 mm Hg, 95% CI –15.0 to 3.4 mm Hg, $p < 0.01$) and propofol (–9.6 mm Hg; 95% CI –21.3 to 2.2 mm Hg, $p = 0.11$) were associated with a lower pooled mean MAP 2 minutes postinduction. The remaining 18 studies in elective surgical patients showed mixed results, overall there was a trend to decrease in postinduction MAP with the use of propofol and benzodiazepines compared with etomidate. Of the 5 studies including critically ill patients, 2 showed a significant increase in hypotension (SBP < 90 mm Hg) with midazolam while the others showed no differences in MAP between barbiturates, midazolam and etomidate. **Conclusion:** The available evidence suggests that barbiturates and propofol lead to brief reductions in MAP in elective surgical patients. The data on critically ill patients indicate an increased risk of hypotension with the use of midazolam. **Keywords:** etomidate, mean arterial pressure, procedural sedation

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OUTCOMES of emergency department patients discharged with nonspecific vertigo or dizziness

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Introduction: Patients discharged from an emergency department (ED) with nonspecific vertigo or dizziness (NVD) form a cohort with a broad range of potential etiologies. We attempted to determine this cohort's long-term outcomes. **Methods:** A retrospective administrative database review was undertaken for patients who were discharged from 2 urban EDs with a primary discharge diagnosis of NVD (ICD10 R42) from Aug. 1, 2005, to Aug, 1, 2007. This cohort was probabilistically linked to both the regional ED administrative database and the provincial vital statistics database. The primary outcome was the combined rate of stroke, significant cardiopulmonary diagnoses (ACS, COPD, CHF, syncope, dyspnea NYD, heart block), vertigo related diagnoses (NVD, fall with fracture) requiring admission, or death at 1 year. The secondary outcome was the rate of ED revisits within 1 year. **Results:** Data on 1286 patients were collected during the 2-year period. Overall there were 69 index admissions (5.4%) leaving 1217 patients. The mean age was 55.3 (SD 18.5) years; 44.9% were male, and 34.6% arrived via ambulance. A total of 349 discharged patients received head CTs (28.7%); 92 patients (7.6%) had consult orders. Within 1 year of the index visit there were 33 patients with a revisit readmission (RA) to the same hospital or ED visit/admission (VA) to a different regional site for a cardiopulmonary or neurologic diagnoses (2 CVAs). Overall there were 16 total deaths (D). Two patients had a cardiorespiratory etiology and 1 died of a CVA. Of note, there was an 8-fold increase in composite end point of RA + VA + D in the subset of patients greater than or equal to 75 (22/214) compared with those patients under 75 years old (13/1003). A total of 73 patients (6%) had repeat visits for NVD during the subsequent 12 months. **Conclusion:** Recidivism rates among discharged with NVD are significant. Elderly patients 75 years of age or older have an 8-fold risk (10%) of serious cardiorespiratory or neurologic problems within 1 year compared with those under 75. **Keywords:** nonspecific vertigo, recidivism, administrative database research

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OUTCOMES of acetaminophen overdose in the United States: a population-based study of hospitalizations between 1993 and 2007

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Introduction: Population-based data describing the outcomes of acetaminophen overdose (AO) in North America are limited. We sought to examine rates and predictors of acute liver injury (ALI), acute liver failure (ALF) and mortality following AO using a United States (US) nationwide database. **Methods:** Adult patients hospitalized for AO in the US between 1993 and 2007 were identified using the Nationwide Inpatient Sample (NIS) database and International Classification of Diseases codes. We used validated coding algorithms to identify the presence of ALI (alanine aminotransferase > 1000 IU/L) and ALF (hepatic encephalopathy and INR > 1.5). The circumstance of the overdose (intentional v. unintentional) was identified using E-codes. Independent predictors of hepatotoxicity and in-hospital mortality were evaluated using multivariate logistic regression models with adjustment for patient and hospital factors including hospital volume. **Results:** Between 1993 and 2007 there were 75 439 discharges for AO identified in the NIS database that met the inclusion criteria. Overall, 5641 patients (7%) developed ALI; 3062 (4%) developed ALF; 995 (1%) died. Independent predictors of ALI included middle age (41–60 yr v. ≤ 40 yr: adjusted odds ratio [OR] 1.19, 95% CI 1.11–1.28), white race (OR 1.11, CI 1.03–1.19), unintentional overdose (OR 3.05, CI 2.85–3.26), and an increasing number of comorbid conditions, including underlying liver disease (OR 2.28, CI 1.96–2.66), alcohol abuse (OR 1.18, CI 1.10–1.27) and malnutrition (OR 3.41, CI 2.72–4.28). Patients hospitalized in high-volume centres, those transferred from another institution and admitted during more recent years were more likely to develop ALI. Similar factors were associated with progression to ALF and in-hospital mortality. **Conclusion:** Independent predictors of ALI, ALF and mortality after acetaminophen overdose include older age, unintentional overdoses, underlying liver disease and malnutrition. Further studies are necessary to identify means of improving outcomes among these high-risk patient subgroups. **Keywords:** acetaminophen poisoning, acute liver injury, risk prediction

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DO delayed consultation responses prolong ED and hospital length of stay?

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Introduction: Delayed consultation response to emergency patients requiring hospitalization may prolong ED boarding time and aggravate ED crowding. Slower consultation response may also delay initiation of care by the most appropriate service, extend time spent in a suboptimal environment and prolong overall hospital length of stay (LOS). Our objective was to determine the impact of delayed consultation on overall hospital LOS. **Methods:** This administrative database study was conducted at the Rockyview Hospital, an urban Calgary ED with an annual census of 70 000 visits. Eligible patients included all those admitted to the RVH Hospitalist service from Sep. 1, 2007, to Aug. 31, 2008. Time from triage to inpatient admission order (ADM) was used as a proxy for consultation delay. Based on triage-to-ADM time interval, patients were stratified into 5 successive delay groups (0–4 h, 4–8 h, 8–12 h, 12–16 h and > 16 h). The primary outcome was overall mean hospital LOS by delay group.

Results: During the 1 year period, 2979 admissions were studied, including 76 (2.6%) in the 0–4 hour delay group, 481 (16.1%) in the 4–8 hour group, 591 (19.8%) in the 8–12 hour group, 422 (14.2%) in the 12–16 hour group and 1409 (47.3%) in the > 16 hour group. Overall mean age was 74.3 years, 56.7% of patients were female, 56.4% arrived by EMS and 53.4% were in CTAS level 3. Mean ED LOS and hospital LOS (SD) for the entire study cohort were 22.8 (12.0) hours and 438.1 (622) hours. Patients in the 0–4 hour (short delay) category were younger, more often male, higher acuity and more likely to arrive by EMS. Consultation delays were associated with prolonged ED LOS (8.1, 11.4, 15.5, 19.9 and 31.4 h by group) and hospital LOS (369, 401, 381, 427 and 481 h). **Conclusion:** Younger sicker patients experienced shorter consultation delays. Patients with prolonged consultation delays had hospital lengths of stay 80–112 hours (3–5 d) longer. Further analysis is required to determine the impact of complexity covariables on these profound outcome differences. **Keywords:** consultation delays, emergency crowding, administrative database study

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EVALUATION of a structured wellness curriculum for emergency medicine residents

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Introduction: Residency training is known to be a stressful period on the career path to becoming a physician. Emergency medicine (EM) residents face unique stressors such as shift work, the potential for violence in the workplace and other occupational health risks. The objective of this study was to assess the wellness of Canadian EM residents and to determine whether a structured wellness curriculum resulted in improved well-being. **Methods:** A pilot, controlled trial was performed. EM residents from 3 Canadian programs were approached to complete a baseline questionnaire about their wellness. EM residents involved in the intervention program participated in a structured wellness curriculum that involved 2 one-on-one meetings with a staff wellness advisor. These meetings generated common "wellness themes" which were then the subject of 2 staff-planned wellness academic half days. EM residents in the 2 control sites did not receive any structured wellness initiatives. Resident wellness was then reassessed 1 year later. Wellness was measured with 2 standardized tools, the SF-8 (which contains a physical [PCS-8] and mental health [MCS-8] component) and the Brief Resident Wellness Profile (BRWP). **Results:** A total of 33 EM residents participated (17 intervention, 16 control; response rate 89%). The average age was 30 (SD 2.2) years and 69.7% of the residents were male. The majority of the residents (70.6%) in the intervention group felt they benefited from the wellness curriculum; 12 (70.6%) found the meetings with the wellness advisors useful, whereas only 2 (11.7%) found the academic half-day presentations useful. Physical health (PCS-8) improved significantly in the intervention group ($p = 0.012$) and decreased significantly in the control group ($p = 0.033$). No significant differences were found in mental health scores or in the BRWP. **Conclusion:** EM residents appear to benefit from a structured wellness curriculum. The optimal design and evaluation of such programs warrants further study. **Keywords:** wellness curriculum, residency training, controlled trial

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EMERGENCY department conditions associated with the number of patients who leave a pediatric emergency department before physician assessment

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Introduction: As emergency department (ED) waiting times and volumes increase, substantial numbers of patients leave before physician assessment. Little research, and none in a pediatric setting, has been conducted on ED factors associated with the number of patients who LWBS (patients who leave after first contact with the ED, either registration or triage, but before being seen by a physician). The objective of this study was to identify ED conditions reflecting patient input, throughput and output associated with the number of patients who LWBS in a pediatric setting. **Methods:** This study was a retrospective, observational study using data from 1 tertiary care pediatric ED. The study population consisted of all patient visits to the ED from April 2005 to March 2007. Multivariate Poisson regression analyses were used to examine the impact of variables describing the timing of patient arrival and ED conditions including patient acuity, volume and waiting times on the number of patients who LWBS. **Results:** During the study period there were 138 361 patient visits corresponding to 2190 consecutive shifts; 11 055 (7.99%) of patients left before being seen by a physician. In the multivariate analysis, the number of patients who LWBS was highest for the overnight shift as compared with the day shift (rate ratio 0.44 95% CI 0.36–0.53) and the evening shift (rate ratio 0.81 CI 0.69–0.95). The throughput variables, time from triage to physician assessment (rate ratio 2.11 95% CI 2.01–2.21) and time from registration to triage (rate ratio 1.55 95% CI 1.25–1.90) had the largest impact on the number of patients who LWBS. **Conclusion:** Throughput variables were the most predictive of the number of patients who LWBS. Interventions designed to decrease the number of patients who LWBS should focus on improving ED throughput, particularly on overnight shifts. **Keywords:** LWBS, throughput measurements, emergency crowding

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PREDICTORS of admission in Canadian Emergency Department Triage and Acuity Scale level V patients

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Introduction: Canadian Emergency Department Triage and Acuity Scale (CTAS) level V patients are sometimes admitted to hospital despite being assessed as nonurgent. This study sought to determine the frequency and patient factors known before triage associated with admission. **Methods:** We reviewed ED records with CTAS-V from Apr. 1, 2003, to Sep. 30, 2009, from the National Ambulatory Care Reporting System and Discharge Abstract Database at 3 tertiary academic hospitals in a single city in Ontario. We conducted backward stepwise logistic regression to determine independent predictors of admission known at time of triage. **Results:** Over the study period, there were 37 416 CTAS-V patients. The mean age was 36.9 (standard deviation [SD] 20.7) and 55.1% were male. A total of 84.0% of patients were discharged, 13.1% left before discharge, 1.5% were admitted and the rest was transferred. The mean length of stay for admitted patients was 8.2 (SD 11.39) days. Admission to hospital was more likely if the patient was over age 65 (odds ratio [OR], 5.45, 95% confidence interval [CI] 4.57–6.51), and arrived by ambulance (OR 7.41, 95% CI 6.14–8.94). **Conclusion:** Admission to hospital in CTAS-V patients was associated with age over 65 and arrival by ambulance. Although these findings need to be validated in other populations, they should be considered in future triage and ED flow plans. **Keywords:** low acuity patients, admission predictors, CTAS

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MINOR and minimal head injuries in patients on warfarin

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Introduction: There is currently very little evidence to guide physicians on how to manage emergency patients who sustain a minor or

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minimal head injury (HI) while on warfarin. The objective of this study was to determine the incidence of intracranial bleeding (ICB) in anticoagulated patients with minor (initial GCS of 13–15 with witnessed loss of consciousness [LOC]/confusion or amnesia) and minimal (no LOC/amnesia/confusion) HIs and the association of ICB to clinical features, and international normalized ratio (INR) level. **Methods:** Historical cohort study of all adult patients who presented to 2 tertiary care EDs over 2 years with minor or minimal HIs, identified through the National Ambulatory Care Reporting System database, while on warfarin with INRs of 1.5 or greater. Exclusions included penetrating injuries, new focal neurologic deficits and previous brain surgery. Our structured data collection tool included 25 variables from history, physical exam, CT, surgical interventions, return visits and death. Our outcome, ICB, included any type of bleed within the cranium, and was determined by either 1) CT during initial ED visit, or 2) CT during a subsequent ED visit at any of the 4 regional hospitals within 2 weeks of the initial visit. **Results:** We identified 176 patients, of which 60.2% were female, mean age was 79.0 (range 25–100) years and mean INR was 2.5 (range 1.5–8.2). A total of 157 patients (89.2%) had CT scans and 28 (15.9%) had ICB. Comparing the group with ICB to the group with no ICB there was no significant difference in INR levels (mean 2.53 v. 2.45, $p = 0.5$), respectively, while LOC correlated with higher incidence of ICB (28.6% v. 10.8%, $p < 0.05$), respectively. Incidence of ICB was 21.9% in the minor HI group versus 4.8% in the minimal group. **Conclusion:** The incidence of ICB in patients on warfarin is considerable. LOC was associated with higher rates of ICB. This study supports a low threshold for ordering a CT scan for patients with minor or minimal head injuries who are on warfarin. **Keywords:** minor head trauma, warfarin, intracranial bleeding

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PROFILING the burden of night work in an academic emergency department

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Introduction: Night shifts are widely regarded as a drawback of being an emergency physician (EP). The objective of this study was to profile the burden that working traditional night shifts (11 pm–7 am) poses toward physicians working in an academic emergency department (ED). **Methods:** An online, 37-item survey was distributed to all 43 EPs working in the EDs of an academic centre (annual census of 150 000). Participants rated their level of agreement on a 7-point Likert scale regarding questions related to night work. **Results:** A total of 43 (100%) questionnaires were completed. Of respondents, 69.8% were male and most commonly had greater than 15 years' experience (30.2%) and lived with partner and children (67.4%). Recovery to baseline vegetative routine after a single night shift was most common after 1 day (55.8%) and after multiple night shifts was days or greater (95.3%). A total of 33 (76.7%) EPs felt they were more irritable following night shifts compared with other shifts. EPs are involved significantly less in household responsibilities (69.8%), hobbies (62.8%) and academic work (76.8%) following night shifts. The majority (79.1%) stated night shifts are the greatest drawback of their job while the same proportion (79.1%) list shift work as one of the greatest advantages of being an EP. The majority of respondents reported that teaching (74.4%), diagnostic test interpretation (58.1%), quality of handover (60.5%) and decisiveness regarding patient care plans (72.1%) are inferior on night shifts compared with day shifts. Despite receiving 150% of day wages, 29 (67.4%) deny financial motivation to work night shifts and 21 (48.8%) felt that the financial remuneration does not justify the disruption caused by working night shifts. **Conclusion:** ED physicians experience significant morbidity related to traditional night shift duties. These deleterious effects span the domains of sleep physiology, home life, mood, academic productivity and perceived job performance. Study into the role and effects of differently structured night shifts may be warranted. **Keywords:** shiftwork, night shifts, survey research

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PEDIATRIC mental health emergencies: a systematic review of crisis interventions used in the emergency department

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Introduction: Mechanisms that promote optimal care of pediatric mental health in the emergency department (ED) need to be developed. This systematic review evaluated the effectiveness of management interventions for pediatric mental health. **Methods:** We searched electronic databases, references, key journals and proceedings from 1985 to 2009. Studies that evaluated ED-based assessment, treatment or psychosocial management were included. The primary focus was on pediatric-based studies, but adult-based studies were used to make recommendations for future pediatric investigation. One reviewer extracted the data and a second checked for completeness and accuracy. Calculations for primary outcomes included odds ratios (ORs) and mean difference (MD) with 95% confidence intervals (CIs). **Results:** Twelve observational studies were included with pediatric ($n = 3$) and adult/unknown ($n = 9$) aged participants. Pediatric studies supported the use of specialized care models to reduce hospitalization (OR 0.45, 95% CI 0.33 to 0.60), return visits (OR 0.60, 95% CI 0.28 to 1.25) and length of stay (MD –43.1 min; 95% CI –63.088 to –23.11). In adult studies, reduced hospitalization was reported with use of a crisis intervention team (OR 0.59; 95% CI 0.43 to 0.82). Five adult studies assessed triage scales. In a comparison of a mental health scale to a national standard, one study demonstrated reduced wait (MD –7.7 min; 95% CI –12.82 to –2.58) and transit (MD –17.5 min; 95% CI –33.00 to –1.20) times. Several studies reported a shift in triage dependent on the scale or nurse training (psychiatric v. emergency), but linkage to system- or patient-based outcomes was not made, limiting clinical interpretation. **Conclusion:** A small number of studies demonstrated that specialized care models can reduce hospitalization, return ED visits and length of ED stay. Future research must address the reality of the available health care infrastructure, while also determining the most relevant patient-centred outcomes to complement the existing literature on health-services outcomes. **Keywords:** pediatric mental health, specialized care models, emergency crowding

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EXAMINATION of Stethoscope Contamination in the Emergency Department (EXSCITED) pilot study

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Introduction: The objective of this study was to determine the prevalence of *Staphylococcus*-contaminated stethoscopes belonging to emergency department (ED) staff and to identify the proportion of these that are *Staphylococcus aureus* or methicillin-resistant *S. aureus* (MRSA). **Methods:** We conducted a prospective observational cohort study of bacterial cultures from 100 ED staff members' stethoscopes at 3 EDs. Study participants were asked to complete a questionnaire. **Results:** Fifty-four specimens grew coagulase negative staphylococci and 1 grew methicillin-susceptible *S. aureus*. No MRSA was cultured. Only 8% of participants, all of whom were nurses, reported cleaning their stethoscope before or after each patient assessment. Alcohol-based wipes were most commonly used

to clean stethoscopes. A lack of time, being too busy and forgetfulness were the most frequently reported reasons for not cleaning one's stethoscope in the ED. **Conclusion:** This study suggests that although stethoscope contamination rates in these EDs are high, the prevalence of pathogenic bacteria such as *S. aureus* or MRSA on stethoscopes is low. **Keywords:** stethoscope contamination, MRSA, infection control

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FACTORS prolonging emergency department length of stay for patients undergoing successful DC cardioversion for acute atrial fibrillation: a prospective logistic regression analysis

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Introduction: Emergency department (ED) length of stay (LOS) is a key performance indicator and prolonged LOS may contribute to ED crowding and access block. Atrial fibrillation is the most common dysrhythmia seen in the ED. We studied factors predicting increased LOS for patients discharged from the ED after successful DC cardioversion. **Methods:** Consecutive patients undergoing DC cardioversion at a single centre were prospectively enrolled. Those admitted to hospital or failing DC cardioversion were excluded from the LOS analysis but included for a safety analysis. Forty-eight predictor variables including comorbidities, outpatient medications, adverse events and all ED treatments (e.g., rate control, antiarrhythmics and procedural sedation) were documented. The primary outcome was ED LOS, while safety outcomes included prespecified adverse events and stroke, death or return visits to a regional ED within 7 days. Logistic regression models were used to predict which variables increased ED LOS. Generalized estimating equations were used to handle multiple correlated visits. **Results:** A total of 233 subjects were enrolled and analyzed for safety. Of those, 29 were admitted or failed cardioversion, leaving 204 for LOS analysis. Median LOS was 3.17 (IQR 2.20–4.23) hours. Multiple linear regression showed that initial ED use of rhythm medication increased LOS by 2.25 hours (95% CI 1.59–2.91, $p < 0.001$) while initial rate control medications increased LOS by 0.91 hours (95% CI 0.22–1.68, $p = 0.01$). Consulting a specialty service before DC cardioversion increased LOS by 4.48 hours (95% CI 3.40–5.47, $p < 0.001$). The regression model explained 47% of the variance in ED LOS ($F7, 190 = 23.9$; $p < 0.0001$). No deaths or strokes occurred within 7 days (95% CI 0.0%–1.3%). **Conclusion:** ED cardioversion and discharge appears safe. Modifiable contributors to prolonged ED length of stay in patients are initial use of rate or rhythm control medications, or cardiology consultation before initiating electrical cardioversion. **Keywords:** electrical cardioversion, atrial fibrillation, emergency crowding

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EVIDENCE for the use of biomarkers in diagnosing acute myocardial ischemia: a systematic review for the 2010 guidelines for CPR and ECC

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Introduction: The revised Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care will be published in 2010. As part of the revision process, this systematic review evaluated the use of biomarkers in diagnosing patients with acute coronary syndrome (ACS). **Methods:** A literature search in MEDLINE, Embase, Cochrane DSR, ACP Journal Club, DARE, CCTR, CMR, HTA and NHSEED for studies from 2004 to 2008 evaluating the value of biomarkers in diagnosing ACS was performed. Manuscripts were included based on criteria focusing on studies relevant to the diagnosis of ACS in patients presenting with symptoms of cardiac ischemia. The level of evidence and quality of each study were evaluated based on established criteria by the International Liaison Committee on Resuscitation. Studies "supported" the use of its respective biomarker if it had a sensitivity of greater than_95% or a specificity of greater than 92% combined with a sensitivity of greater than 90%. **Results:** A total of 359 studies were identified, of which 71 were included for final review. Eight studies supported cardiac troponin (Tn) testing alone in the diagnosis of acute myocardial infarction (AMI), but not unstable angina, when serum testing was drawn at least 6 hours after symptom onset, emergency department (ED) presentation or serially. No studies supported Tn testing outside of the ED or a short stay cardiac unit. Newer-generation sensitive Tn assays were more sensitive compared with conventional Tn assays when diagnosing AMI. Nine studies showed improved sensitivity when Tn was combined with an early marker (CKMB, ischemia-modified albumin or myoglobin). No studies supported the use of "novel" biomarkers in isolation of Tn. **Conclusion:** Cardiac Tn was more sensitive than other biomarkers when diagnosing AMI when testing occurred more than 6 hours after symptom onset, ED presentation or serially. Tn testing combined with an early marker of injury showed improved sensitivity. Newer-generation sensitive Tn assays were more sensitive than previous Tn assays in the diagnosis of AMI. **Keywords:** cardiac biomarkers, troponin, systematic review. **Disclaimer:** This review includes information on resuscitation questions developed through the C2010 Consensus on Science and Treatment Recommendations process, managed by the International Liaison Committee on Resuscitation (www.americanheart.org/ILCOR). The questions were developed by ILCOR task forces, using strict conflict of interest guidelines. In general, each question was assigned to 2 experts to complete a detailed structured review of the literature and complete a detailed worksheet. Worksheets are discussed at ILCOR meetings to reach consensus and will be published in 2010 as the Consensus on Science and Treatment Recommendations (CoSTR). The conclusions published in the final CoSTR consensus document may differ from the conclusions in this review because the CoSTR consensus will reflect input from other worksheet authors and discussants at the conference, and will take into consideration implementation and feasibility issues as well as new relevant research.

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THE EFFECT of a brief emergency medicine educational intervention on the number of shifts worked by physicians in the emergency department

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Introduction: Some emergency departments (EDs) in Canada have increasing difficulty maintaining full physician staffing, and temporary ED closures sometimes occur. The Ministry of Health funded a brief Emergency Medicine Primer (EMP) course for physicians to upgrade or refresh skills so that they might increase their work in the ED. We sought to determine the effect of the EMP on the ED workload of physicians. **Methods:** A retrospective longitudinal study of ED work of 239 physicians in the 2 years before and 2 years after completing an EMP course in 2006–2008, compared with ED work of non-EMP physicians. Outcomes were the number of ED shifts per month, and the number of ED patients seen per month. We conducted 2 analyses: a before and after comparison of all EMP physicians, and a matched-cohort analysis matching each EMP physician to 4 non-EMP ED physicians based on sex, year of medical school graduation, rurality and pre-EMP ED workload. **Results:** Postcourse, EMP-physicians worked 0.7 ($p = 0.0032$) more ED shifts per month (13% increase) and saw 15 ($p = 0.0008$) more patients per month (17% increase) as compared with matched non-EMP physicians. The greatest increases were among EMP physicians who were younger, urban,

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with ED experience or in a high volume ED. The impact of the EMP on physicians with no prior ED experience, and those working in rural areas, was negligible. **Conclusion:** The EMP was associated with modest increases in ED workload in some physicians, especially younger ones in urban areas. Little effect was seen among rural physicians, or those working in rural areas. **Keywords:** emergency medicine primer, physician workload, physician productivity

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VARIABILITY in computed tomography utilization by emergency physicians in 3 urban hospitals

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Introduction: CT utilization by emergency physicians is variable. CT imaging adds cost, places demands on limited diagnostic imaging resources, prolongs ED length of stay and exposes patients to radiation injury or contrast reactions. If there is substantial practice variation, this has implications regarding diagnostic cost-effectiveness, patient safety and satisfaction, departmental efficiency and modeling behaviour for trainees. Our objective is to describe physician variability in the use of CT imaging in 3 urban Calgary EDs. **Methods:** This retrospective cohort study was conducted at 3 EDs in Calgary, Alta., over a 1-year period. Every patient visit and CT image was linked to a hospital site and ED physician. Our primary outcome was the physician-specific CT imaging rate in CTAS level 3, defined as the proportion of these patients who had a CT scan during their ED visit. Secondary outcomes included the CT imaging rate for all patients (aggregate and stratified by physician), and the CT imaging rate stratified by hospital site and triage level. **Results:** During a 1-year evaluation period, 115 ED physicians treated 188 699 patients, including 93 510 (49.6%) in CTAS level 3. The overall CT rate for all patients was 12.8% (24 070/188 649) and the rate within CTAS-3 was 12.1% (11 313/93 510). Imaging rates varied by site and ranged from 0.9% in CTAS level 5 to 24.7% in CTAS level 1. The median CT rate for our physicians, within CTAS level 3, was 12.0% (IQR 10.0%–14.6%). In the CTAS-3 cohort, the lowest using physician scanned 1.8% of patients (19/1069) while the highest user scanned 25% of patients (229/915). **Conclusion:** There is profound variability in the utilization of CT scans among physicians working in similar settings with comparable patient groups. Efforts are required to understand this practice diversity and develop strategies to converge on a more rational cost-effective approach to diagnostic utilization. **Keywords:** CT utilization, practice variation, administrative database research

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CAN I SCRAP the CT chest? The internal validation of a CDR to rule-out major thoracic injury in major blunt trauma

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Introduction: To validate the results of the SCRAP clinical decision rule derivation study. The derivation study found that in major blunt trauma patients, when the 5 scrap variables were normal there were no major thoracic injuries. The 5 variables used were abnormal chest XR, abnormal thorax palpation, abnormal chest auscultation, abnormal oxygen saturation (defined as < 95% on RA or < 98% on oxygen), and respiratory rate greater than 24. **Methods:** Data were retrospectively obtained from a chart review of all trauma patients presenting to a Canadian tertiary trauma care centre from April 2006 to March 2007. Patients were included if they had a CT chest at admission or had a documented major thoracic injury noted in the trauma database. Patients with penetrating injury or GCS less than 9 were excluded. Three data collectors ($\kappa = 0.83$) collected 28 data points, which were then analyzed for their predictive value. The data was analyzed using basic statistics and logistic regression analysis. **Results:** There were 180 patients that met inclusion criteria. The average ISS of these patients was 23. Once again, the SCRAP variables were found to be highly predictive of injury, and when none of these variables were present, no patients had major thoracic injury (Sens 100% [95.6%–100%], Spec 45% [33.9%–57.2%], NPV 100% [87.3%–100%]). **Conclusion:** This study confirms the result of the derivation study and retrospectively shows that the SCRAP rule is effective in predicting major thoracic injury in this population. The use of the SCRAP rule would have prevented 45.3% (34/75) of the negative CT chests without missing a major thoracic injury. The next step will be to validate the results of this study in a prospective, multicentre study. **Keywords:** blunt trauma, clinical decision rule, internal validation

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SAFETY of assessment of patients with potential ischemic chest pain in an emergency department waiting room: a prospective comparative cohort study

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Introduction: Emergency department (ED) crowding has been associated with a variety of adverse outcomes. Current guidelines suggest that patients with potentially ischemic chest pain should undergo rapid assessment and treatment in a monitored setting to optimize the diagnosis of acute coronary syndrome (ACS). These patients may be at high risk of misdiagnosis and adverse events when evaluation is delayed because of ED crowding. In order to mitigate crowding-related delays, we developed processes that enabled emergency physicians to evaluate chest pain patients in the waiting room (WR) when all nurse-staffed stretchers are occupied. The objective of this study was to investigate the safety of WR chest pain evaluation. **Methods:** This prospective comparative cohort study was conducted in a tertiary care ED. Explicit triage and waiting room evaluation processes were introduced. A total of 1107 patients with chest pain of potential cardiac origin were triaged either to a monitored bed (MB) or a WR chair, depending upon bed availability and triage judgment. After diagnostic evaluation, patients were followed for 30 days to identify the proportion of missed cases of ACS and other prespecified adverse events. Analysis was based on intention-to-treat. **Results:** A total of 804 patients were triaged to MB and 303 to WR evaluation. The WR had less cardiovascular risk factors than the MB group, although initial vital signs were similar. The rate of ACS, was 11.7% in the MB group and 7.6% in WR patients. There were no missed ACS cases in either the MB group (0%, 95% CI 0.0%–0.4%) or the WR group (0%, 95% CI 0.0%–1.0%). There were 32 adverse events in the MB group (4.0%, 95% CI 2.6%–5.3%) and 2 in the WR group (0.7%, 95% CI 0.0%–1.6%). **Conclusion:** An organized approach to triage and waiting room evaluation for stable chest pain patients is safe. Although waiting room evaluation is not ideal, it may be a viable contingency strategy for periods when ED crowding compromises access to care. **Keywords:** waiting room medicine, chest pain, patient safety

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DEVELOPMENT of a CanMEDS-based multisource feedback evaluation tool for emergency physicians

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Introduction: Quality and patient safety initiatives are gaining momentum in health care. Additionally, Canada has been a leader in the development of outcome-based medical education with the CanMEDS

competency framework, widely used for the assessment of resident trainees. However, there is a paucity of research applying CanMEDS competencies to practising physicians. The use of multisource feedback (MSF) has recently been adopted for physician evaluation. A MSF tool based on the CanMEDS competencies is a logical next step to ensure quality of patient care by practising emergency physicians (EPs), and to ensure faculty are proficient in the competencies they are expected to emulate to their trainees. **Methods:** The authors reviewed the literature and emergency medicine (EM) training requirements to develop a comprehensive list of evaluation criteria for each of the CanMEDS competencies. These criteria were subjected to 2 rounds of consensus. A 5-point Likert scale was constructed for Round 1 items, surveying all stakeholders (EPs, EM residents, off-service residents, consultants, emergency department [ED] nurses, ED pharmacists, ED unit clerks/aides, social workers, bed managers and emergency medical services personnel) with a cut-off median value of 3.5 for inclusion of criteria. Round 2 surveyed EPs to indicate which health care providers would be best able to evaluate each criterion, with a minimum 50% consensus cut-off value for evaluator selection. **Results:** The final tool included all valid evaluation criteria and the health care professionals considered to be qualified to evaluate each criterion. **Conclusion:** It is possible to develop a validated, specific, CanMEDS-based evaluation tool for practising EPs. This method can be used as a model by other physician groups for development of their own MSF tool, or the tool can simply be used by other EP groups. Further research should assess physician satisfaction with the MSF process and the impact of MSF tools on EP performance. **Keywords:** CanMEDS, multisource feedback, consensus methodology

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UTILIZATION of 7 clinical decision units in Ontario's pilot program

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Introduction: Clinical decision units (CDUs) within emergency departments (EDs) have been proposed as a means of improving patient flow by reducing length of stay (LOS) and/or the need for admission in selected patient groups. In 2008, the Ontario Ministry of Health introduced physician funding for CDUs in 7 EDs. We undertook a preliminary evaluation of this pilot program. **Methods:** We conducted a retrospective analysis of unscheduled ED visits at all 7 CDU pilot sites in the first 11 months of implementation (October 2008 to September 2009) using routinely collected administrative data and key informant interviews, examining trends in CDU utilization and occupancy (measured as the percentage of designated CDU bed-hours occupied in each 24-hour period) as well as ED visit characteristics of CDU and non-CDU patients. **Results:** CDU admissions comprised 3.2% of ED visits (range across sites 1.8%–4.7%); the average daily number of CDU patients was 4.2 (2.2–5.7); occupancy was 47.6% (22.4%–72.8%). CDU patients were older (mean [SD] age 56.4 [21.6] v. 44.5 [24.5]) and were typically triaged as higher acuity (43.5% v. 21.3% resuscitation/emergent) than non-CDU patients. For CDU patients, the median (IQR) and 90th percentile ED LOS, including CDU LOS, were 12.9 (8.8–19.4) and 26.3 hours, respectively; median (IQR) CDU LOS was 8.2 (4.8–14.1) hours. CDU patients were more likely to be admitted than non-CDU patients (19.8% v. 15.2%). The most common indications for CDU admission were chest pain (17.2%) and abdominal pain (9.0%). Among non-CDU patients, up to 6.9% were potentially eligible for admission to the CDU (based on a predefined indication for CDU admission and an ED LOS of > 6 hours). **Conclusion:** CDU utilization varied substantially and there appears to be potential for increasing use. In general, CDU patients were older and more acute/complex than non-CDU patients. The next phase of this study will examine the overall impact of the pilot program with respect to ED crowding, ED revisit and short-term admission rates. **Keywords:** clinical decision units, practice variation, emergency crowding

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PEDIATRIC pain practice variation among emergency doctors: a Canadian survey

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Introduction: Eighty percent of all emergency department (ED) visits involve pain, yet pain treatment is suboptimal, especially in children. This study aimed to describe (a) pediatric pain management practices across Canada and (b) the presence of policies that may facilitate or hinder pain management. **Methods:** The study tool design was based on expert opinions and measurement literature. The Pediatric Emergency Research of Canada database was used to contact physicians (MDs), using a modified version of Dillman's Total Design Survey Method. **Results:** The response rate was 68% (139/206). Greater than three-quarters of responding MDs are 31–50 years old, 56% have a pediatric emergency fellowship and more than one-half have 10 years or less of practice. Almost all pain screening in EDs occur at triage. Less than one-half of MDs note mandatory pain score documentation, and one-third indicate absence of standing orders for pain treatment. Ibuprofen and acetaminophen are almost equally prescribed in the pediatric ED for mild–moderate pain. Codeine is prescribed for otitis media by 23% of MDs, and by 75% for burns. Close to one-half of urinary catheterizations and IV starts are done without any analgesia. Ketamine is the most common agent for procedural sedation, with less than 10% using propofol. Pacifier use is the most common nonpharmacologic intervention. Training background and increasing age of MDs affects likelihood of using various nonpharmacologic therapies ($p = 0.01$) or topical anesthetics ($p = 0.02$ for training, $p = 0.04$ for age). Female MDs are more likely to allow breastfeeding during painful procedures ($p = 0.0007$). Greater than 90% of MDs allowed parents to remain present for painful procedures; however, parents often opt out. **Conclusion:** Despite good evidence, many pharmacological and nonpharmacological interventions are underused. Ibuprofen is used as frequently as acetaminophen for mild–moderate pain. There is a substantial evidence–practice gap in the management of children's pain by pediatric emergency physicians. **Keywords:** pediatric pain management, practice variation, survey research

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EMERGENCY department use of Rh immune prophylaxis in early pregnancy

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Introduction: Conflicting guidelines exist concerning the administration of Rh immune prophylaxis (WinRho) in first trimester complications. The objective of this study was to describe local emergency department (ED) practice regarding the administration of WinRho and determine the local obstetrical practice pattern regarding the administration of WinRho. **Methods:** A retrospective chart review was conducted by trained research personnel for all female, adult patients with a positive BHCG presenting to the EDs of an academic tertiary care centre with either a presenting complaint or final ED diagnosis that included abortion, miscarriage, bleeding or ectopic pregnancy. Data was gathered from a 1-year period from September 2007 to 2008. The presence of Rh typing and the administration of WinRho in the ED or urgent follow-up were recorded. Surveys were

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sent to consultants in obstetrics and gynecology consisting of 4 case scenarios. Each case was queried if Rh immune prophylaxis was indicated. **Results:** There were 1176 ED visits with a positive BHCG. Analysis of these charts resulted in 474 study visits of interest. Of these visits, only 347 (73.2%) were cross and typed. Fifty-six (16.1%) patients were identified as Rh (–), and only 35 (62.5%) were given Rh immune prophylaxis in the ED or urgent follow-up. Local physicians from obstetrics and gynecology who responded to the survey all agreed that they would give WinRho with vaginal bleeding in 11 weeks and 18 weeks, 67% would give WinRho to patients at 9 weeks gestational age and 67% would give WinRho in trauma with no bleeding. **Conclusion:** This study shows significant heterogeneity in the local ED practice of assessing the need for Rh immune prophylaxis in patients at risk for maternal–fetal transfusion. Education endeavours or the development of a clinical pathway may lead to improved care in this population of patients. **Keywords:** Rh immune prophylaxis, threatened miscarriage, health records review

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INTEGRATION of the CanMEDS physician roles into a high fidelity human patient simulator program for Royal College of Physicians and Surgeons of Canada emergency medicine residents

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Introduction: The CanMEDS roles, essential competencies of a Canadian physician, are routinely integrated into resident training. There are no studies examining the integration of CanMEDS roles into a simulator resuscitation program for emergency medicine residents. This study evaluates the integration of the CanMEDS roles, as a basis for assessment, within a high-fidelity human patient simulator (HPS) program for Royal College of Physicians and Surgeons of Canada emergency medicine residents at the UBC. **Methods:** Residents and emergency physicians participated monthly in the HPS program over a 2-year period from September 2006 to June 2008. Residents acted as resuscitation team leaders. Their experiences were evaluated and debriefed using the CanMEDs physician roles as a focus of discussion. Program feedback was obtained at each session and an exit survey was completed. Outcomes included resident and facilitator perception of the integration and the utilization of the roles Medical Expert including knowledge and judgment, Communicator, Manager including Leader, Collaborator, Professional and Scholar into the simulation scenarios and debriefing sessions. **Results:** The final survey of 18 residents and 13 facilitators yielded a 100% response. Of respondents, 82.8% felt the CanMEDS roles could be integrated into simulation education. The following CanMEDS roles were discussed in debriefing sometimes or routinely: Medical Expert 88.8% (knowledge 100% and judgment 100%), Communicator 77.7% and Manager 66.6% (leadership 83.3%). The roles Scholar, Professional and Collaborator were not discussed as routinely. **Conclusion:** The CanMEDS roles Medical Expert (knowledge and judgment), Communicator and Manager (leader) are used in simulated emergency department resuscitation scenarios and can be highlighted in debriefing sessions. The roles Scholar, Professional Collaborator and Advocate require specific scenario designs to highlight their use in resuscitation. Limitations include the small sample size and the application to other education programs. **Keywords:** simulation training, CanMEDS, survey research

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NIAID/FAAN criteria for the clinical diagnosis of anaphylaxis are useful in the emergency department

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Introduction: We sought to determine the accuracy of the National Institutes of Allergy and Infectious Disease/Food Allergy and Anaphylaxis Network (NIAID/FAAN) clinical criteria for the identification of anaphylaxis in emergency department (ED) patients. **Methods:** We conducted an IRB approved observational cohort study of ED patients in a tertiary care centre with approximately 80 000 ED visits annually. All patients diagnosed with allergic reactions or anaphylaxis and a random sample of patients with related diagnoses from April to July 2008 were eligible. ED medical records were reviewed to determine if patients met NIAID/FAAN criteria. Two board certified allergists subsequently and independently reviewed each record and subsequent follow-up records. The consensus diagnosis by the 2 allergists was considered the gold standard for the diagnosis of anaphylaxis. **Results:** Eighty-eight patients constituted the validation sample. The median age was 44.5 (IQR 22.2–66.7) years, 53 (60.2%) were females and 24 (27.2%) were children less than 18 years of age. Among the 88 patients, 33 (37.5%) satisfied the NIAID/FAAN criteria for anaphylaxis. Of these 33 patients, 27 (81.8%) were diagnosed as anaphylaxis by the allergists ($\kappa = 0.73$). In the remaining 55 that did not satisfy NIAID/FAAN criteria, 5 (9.0%) were diagnosed as anaphylaxis by the allergists. The interrater agreement between the allergists was also substantial ($\kappa = 0.75$). The NIAID/FAAN clinical criteria had the following test characteristics: sensitivity 84.4% (95% CI 72%–91%), specificity 89.3% (95% CI 82%–93%), positive predictive value 81.8% (95% CI 70%–88%) and negative predictive value of 90.9% (95% CI 84%–95%). **Conclusion:** The NIAID/FAAN clinical criteria for the diagnosis of anaphylaxis appear to be sensitive and specific in the ED setting. Prospective validation is needed to confirm these results. **Keywords:** anaphylaxis, clinical criteria, health records review

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PNEUMONIA care: the influence of a system wide strategy to reduce ED overcrowding and improve quality of care

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Introduction: Pneumonia is a common emergency department (ED) presentation and wide variability in practice exists. A pneumonia care map (PCM) was implemented in 2005 in the former Capital Health region; in 2006 the Emergency Solutions and Systems Capacity (ESSC) project was implemented to address ED overcrowding. This study examined the effect of both (PCM and ESSC) on accepted quality of care markers for pneumonia in academic and community EDs. **Methods:** Four 6-month periods from January 2006 to December 2008 were examined (baseline, 6, 12 and 18 mo post-ESSC). A retrospective chart review was completed by trained research staff on a random selection of 600 patients/period with pneumonia to examine the quality of care. Pneumonia Severity Index (PSI) scoring, times and evidence-based care were assessed. Kruskal–Wallis and χ^2 statistics were used to compare different time periods. **Results:** Overall, 2562 patients were included and the groups were similar among the study periods. The median age was 54, more males presented and 18% were smokers. Overall, evidence of the use of the PSI in all periods was low (range 1.3%–2.6%). Most patients had a PSI class of 3 or lower. Over time, the median time to MD assessment decreased (108 v. 91 min, $p < 0.001$); however, time to chest x-ray increased ($p = 0.03$) and time to first antibiotic remained unchanged (4.8 v. 4.7 h). Admission occurred in approximately 45% of patients and time from triage to floor transfer increased over the study periods (24 v. 28 h, $p < 0.001$). **Conclusion:** The use of the PSI from the PCM was infrequently observed. The ESSC improves MD assessment times; however, delays in receiving

chest x-rays and antibiotics persisted. Moreover, patients remain confined to the ED following admission for prolonged periods. Improvements in access to investigations and in-patient beds are required to improve the quality of care for all pneumonia patients. **Keywords:** pneumonia severity index, health records review, system-wide interventions

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AIRWAY management and ALS paramedics: knowledge, skill and confidence before and after an intense airway management course

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Introduction: Airway management represents one of the core life-saving skills in the scope of practice of the advanced life support (ALS) paramedic. The objective of this study is to determine if an intense airway management course would improve ALS paramedics' knowledge and confidence in airway management. **Methods:** An intensive airway course, previously taught to physicians, was delivered to all registered ALS paramedics as part of the scheduled inservice. This before-and-after study consisted of an identical survey and exam given at the beginning and end of the 10-hour course. Participants indicated their confidence in 6 areas of airway management using a 4-point Likert scale, and completed a 20-question multiple choice exam. The sample size required to detect a 15% change on the exam was 132 subjects, and to detect a change of 0.5 on the survey, a sample size of 27 was needed. Confidence scores were compared using a Wilcoxon rank sum test, and exam scores with a paired *t* test. Results of an observed skills exam are presented separately. **Results:** A total of 301 ALS paramedics participated; 209 participants reported 6 or more years of ALS experience. Participants reported an average of 2.92 intubations in the past 12 months. The mean precourse confidence score was 2.74 and the mean postcourse confidence score was 3.39 for a difference of 0.66 (95% CI 0.61–0.71). Postcourse exam scores improved by 4.89 (95% CI 4.58–5.20) points, from 7.71 (38.6%) to 12.606 (63.0%). **Conclusion:** Significant improvement in confidence and knowledge was found after paramedics completed a 10-hour airway management course. This result has implications for airway management decisions and clinical outcomes in these high-acuity, time-sensitive situations. Future research includes evaluating retention of knowledge and confidence to determine continuing education requirements. **Keywords:** paramedic training, airway management courses, pre- poststudy design

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IMPLEMENTATION and evaluation of a resuscitation skills simulation program for Royal College of Physicians and Surgeons of Canada emergency medicine residents

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Introduction: The benefits of simulation include direct learner observation, contextual learning and immediate feedback. The purpose of this project developed within the UBC emergency medicine residency program was to implement and evaluate a resuscitation skills program using a high fidelity human patient simulator. **Methods:** Residents and emergency physicians participated in the program monthly over a 2-year period from September 2006 to June 2008. Residents acted as resuscitation team leaders. Their experiences were evaluated and debriefed using the CanMEDs physician roles. Residents completed program feedback forms at the conclusion of each session. Residents and facilitators completed an exit survey. Outcomes include Likert scale ratings of the overall session, case design, reality, facilitator debriefing and teaching and perception of resuscitation skills. **Results:** Seventy session feedback forms were collected. Overall session ratings 98.0% (95% CI 89.1%–99.9%), case design 90.3% (95% CI 85.2%–94.0%) and reality 84.1% (95% CI 78.2%–88.9%) were consistently rated as very good (4/5) or excellent (5/5). Debriefing 92.6% (95% CI 82.1%–97.9%) and teaching 96.2% (95% CI 87.0%–99.5%) with emergency physician facilitators was consistently rated as very good (4/5) or excellent (5/5). The final survey of 18 residents and 13 facilitators yielded a 100% response. The participants felt the simulator had dedicated educator supervision, instant feedback, practical skill development and higher-level skill development such as teamwork and critical thinking. A total of 100% (95% CI 81.5%–100%) of residents and 92.3% (95% CI 64.0%–99.8%) of facilitators stated that the ability to resuscitate an acutely ill patient improved somewhat or significantly. **Conclusion:** This program was rated highly by participants for many of the reasons identified in previous simulation education programs. Feedback is used for program enhancement. Limitations include the small number of participants and the application to other training programs. **Keywords:** simulation training, resuscitation skills, residency training

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THE RETROSPECTIVE pre–post: a practical method to evaluate learning from an educational program

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Introduction: Program evaluation remains a critical, but underutilized, step in medical education. Subjective self-assessment could theoretically be a practical and inexpensive method to assess student learning but previous research has questioned students' ability to self-assess. We compared traditional and retrospective pre–post self-assessment measures to an objective measure of learning to assess which correlated better to actual learning. **Methods:** A total of 47 medical students volunteered for a 4-hour pediatric resuscitation course. Subjective self-assessments were completed for the subject of interest and 2 related distracters (toxicology and fractures), pre- and postintervention. Students were also asked to think back, upon completing the course, and rate themselves at the onset (the "retrospective pre"). The change in traditional and retrospective pre- to postcourse measures was compared with the change on 22-item objectives-based multiple choice "gold-standard" exams. **Results:** Students' subjective mean scores on the traditional and retrospective pre–post designs increased identically from 1.87 to 3.67/5 ($p < 0.001$). Their objective test scores also increased from 12.55 to 17.83 ($p < 0.001$). Correlations between the change in subjective and objective measures revealed a Spearman correlation of –0.02 and –0.13 for the traditional and retrospective pre–post methods. One sample *t* tests comparing the absolute difference between pre and post scores for distracters were expected to be 0. Traditional pre–post showed significant differences for both distracters (fracture 0.45; $p < 0.001$; toxicology 0.30; $p < 0.01$) while the retrospective pre–post showed a small difference for toxicology (0.23; $p = 0.01$) but not fractures (0.08; $p = 0.1$). **Conclusion:** Students accurately identified, but could not quantify, knowledge gain via traditional and retrospective subjective pre–post measures. The retrospective pre–post method of self-assessment more accurately excludes perceived change in subject matter that has not improved. **Keywords:** learner self-assessment, educational research, pre–post study designs

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ADOLESCENT satisfaction in an urban pediatric emergency department

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Introduction: Adolescents are frequently cared for in pediatric emergency departments (ED). In adult populations increased levels of satisfaction are correlated with improved outcomes and utilization of health care resources. No study has focused directly on adolescents to ascertain their level of satisfaction and gather suggestions for improvement. **Methods:** A 33-question survey employing Likert scales and free-text was designed for this study focusing on overall satisfaction, treatment by medical and nursing staff, diagnosis and discharge instructions. The survey was administered to all eligible adolescents at discharge from the ED. **Results:** A total of 282 adolescents were enrolled; 92.4% of respondents rated their satisfaction as good to excellent with no differences observed by age, diagnosis and CTAS score. Almost half of respondents (45.8%) identified a desire to have more adolescent appropriate material in the waiting room and, ideally, their own waiting space. Physicians and nurses were highly regarded and trusted by their patients. However, 184 (67.3%) teenagers did not get an opportunity to meet with their physician alone. Of these, 16 (8.7%) expressed a desire to do so. Discharge diagnosis and treatment plans were understood by 232 (87.2%) of patients. Of the 161 adolescents who had attended a general hospital in the past for any reason only 11 (6.8%) preferred a general hospital ED compared with a pediatric ED. When given the opportunity to write their own responses 77 adolescents expressed a desire to have more teenage appropriate entertainment such as magazines and computers, 60 felt the wait was too long and 16 wanted a larger more comfortable waiting space. **Conclusion:** Adolescents were overwhelmingly satisfied with care in the pediatric ED. Medical staff should make a greater effort to meet with adolescents separate from their caregivers. Finally, institutions should strive to create a more age-appropriate ED environment for adolescents. **Keywords:** adolescents, pediatric emergency medicine, patient satisfaction

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EMERGENCY physicians attitudes about routine screening for adverse drug events

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Introduction: Emergency physicians (EPs) attribute 36% of ED presentations caused by adverse drug events (ADEs) to nonmedication related problems. Routine screening may improve ADE detection, documentation and treatment, but is presently not performed in most EDs because of manpower restrictions. A clinical decision rule (CDR) that flags patients at high risk for ADEs would allow clinical pharmacists to target these patients, while omitting medication optimization in low-risk patients. Our objective was to describe EP attitudes toward routine ED-based ADE screening. **Methods:** We surveyed practising EPs across Canada using the membership list of the Canadian Association of Emergency Physicians (CAEP). An 18-question online survey was developed and pilot tested. An initial email invitation was sent to CAEP members. Two days later another email with a link to the online survey was sent. A reminder email was sent 1 month later. Responses were collated using descriptive statistics. **Results:** The response rate was 22.4%, (257/1148). Most respondents (63.6%,133/209, 95% CI 56.9%–69.9%) indicated that their patients were never evaluated by a pharmacist before discharge and 95.2% (199/209, 95% CI 91.4%–97.4%) indicated that less than 20% of discharged patients were evaluated. Admitted patients were evaluated for ADEs more often, but 62.5% (125/200, 95% CI 55.6%–68.9%) of EPs estimated that less than 20% of admitted patients were screened for ADEs in their hospital. Most respondents (58.3%, 123/211, 95% CI 51.5%–64.7%) thought that routine ED-based screening for ADEs using a CDR was a very good or excellent idea. Of individuals who thought it was only a fairly good idea (38.4%, 81/211, 95% CI 32.1%–45.1%), most were concerned about manpower implications and slowing patient flow. The median desired sensitivity for a CDR was 95% (IQR 95%–98%) for moderate, and 99% (IQR 98%–99%) for severe ADEs. **Conclusion:** Pharmacists do not routinely evaluate ED patients for ADEs. Most EPs thought that routine ADE screening using a CDR was a very good or excellent idea. **Keywords:** adverse drug events, clinical decision rule, physician acceptability

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SEPSIS in Edmonton emergency departments: planting the SEED for reducing sepsis mortality

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Introduction: Sepsis is a potentially life-threatening condition that requires urgent attention and management in the emergency department (ED). Evidence-based clinical guidelines for managing sepsis have been developed; however, the integration of guidelines into routine practice is often incomplete. Clinical decision support systems (CDSS) in the form of care maps may help clinicians meet guideline targets more often and rapidly. **Methods:** We evaluated the impact of implementing an electronic clinical practice guideline (eCPG) on the management and outcomes of patients presenting to the ED with sepsis. A retrospective case–control chart review study was performed over a 3-year period at a tertiary care, university-based, teaching hospital in Edmonton, Alta. Potentially eligible patients were identified by searching the Ambulatory Care Classification System database using ICD-10 codes and ED physician diagnoses of sepsis. Data were compared using McNemar tests (categorical data) or paired *t* tests (continuous data). **Results:** Overall, 51 cases and controls were evaluated. Due to age and sex matching, the average ages were similar between the 2 groups (62 yr) and 60% were male. Patients cared for using the eCPG were more likely to have a CVP measured (55% v. 10%, $p < 0.001$); however, lactate measurement, blood cultures, and other investigations were similarly ordered (all $p > 0.05$). The administration of antibiotics within 3 hours (63% v. 41%, $p = 0.03$) and vasopressors (45% v. 20%, $p = 0.02$) was more common in the eCPG group; however, use of steroids (29% v. 18%) and other interventions were not different between the groups (all $p > 0.05$). Overall, survival was high and not different between groups (82% v. 84%). **Conclusion:** A sepsis eCPG introduced at one hospital experienced variable use; however, patients treated by physicians using the eCPG had improved markers of quality sepsis care. Strategies to increase the utilization of eCPGs in emergency medicine appear warranted. **Keywords:** sepsis, clinical practice guidelines, case–control study

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A PILOT evaluation of the effectiveness of a novel emergency medicine ultrasound curriculum for residents at a Canadian academic centre

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Introduction: Emergency medicine ultrasonography (EMUS) is a new core competency of emergency medicine postgraduate training in Canada, but the effectiveness of current training curricula is not known. We evaluated the effectiveness of a novel intensive EMUS curriculum at the University of Ottawa. **Methods:** This pilot study analyzed existing assessment data from the first cohort of 12 emergency medicine residents to participate in a new EMUS program. All residents had a 1-day ultrasound workshop, and were then divided into 2 groups of 6 for further training. Residents in the intervention group received the initial 2-week bedside scanning course and were compared with the second cohort who did not receive the course

before retesting. A multiple choice question (MCQ) exam and performance assessment (PA) tool were developed based on 4 indications (FAST, Aorta, Cardiac, Gyne) and validated by 3 experts in EMUS. Residents in the intervention group were given both tests before and after the 2 week bedside scanning course. Residents in the control group were evaluated with PA and MCQ at paired times with the intervention group. Paired comparisons were used to examine differences in assessments between the 2 groups. **Results:** All 12 participants completed the study. The MCQ exam scores improved for the IG (22.3 to 31.2) and little change for the CG (27 to 28.9) ($p > 0.05$). The PA scores CG 11.5 to 19.2, and IG 19.4 to 25.3 ($p > 0.05$, d = 1.43). Global rating scores CG 1.6 to 2.3, and IG 2.2 to 3.6 (score of 3 or above meets objectives) showed significant increases ($p < 0.05$, d = 0.72). Interrater reliability for PA and global rating were 0.95 and 0.71, respectively, using Pearson correlation coefficient. Cronbachs α for MCQ is 0.91 for Exam A and 0.87 for Exam B. **Conclusion:** This pilot study demonstrated the effectiveness of this novel, intensive EMUS curriculum. Other programs should consider adopting and evaluating similar models. **Keywords:** ultrasound training, residency training, education research

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PLASTIC consultation in pediatric emergency department

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Introduction: Consultation is a common and important aspect of emergency department (ED) care. Despite its importance, there are no studies that have assessed the agreement between emergency physicians (EPs) and consultants with regard to the perceived urgency of consultation. The primary objective was to assess the agreement between the EPs and consultants with respect to the urgency of plastic surgery referrals in a tertiary care pediatric ED. The secondary objective was to describe the type of injuries referred to plastic surgery at a tertiary care pediatric ED. **Methods:** This was a prospective descriptive study. Eligible patients were identified through the ED via an electronic patient tracking system. All patients who presented to the Alberta Children's Hospital ED, 17 years of age or younger, who received pediatric plastic consultation between July and December 2009 were included in the study. At the time of consultation request, the EP filled out the study form. The rest of the form was completed by the plastic surgeon when the patient was seen. Data are then collected from the consultation form. **Results:** Completed data was available for 49 patients: 39 male and 10 female. Mean age was 9.7 years. Of the referrals, 10% were emergent, 55% were urgent, 32% were semiurgent while 3% were nonurgent. For the urgency of referral, the interobserver agreement (κ) between EP and plastic surgeons was 1 (95% CI 1.0–1.0). The most common injuries were fractures (56.8%), followed by burns and lacerations (11.8% each). Displaced fractures (69.0%) were more commonly referred than nondisplaced fractures. The most common injury locations were the hand (74.5%) and head/face (15.7%). **Conclusion:** There is excellent agreement between the emergency physicians and pediatric plastic surgeons in terms of the urgency of consultation. The most common injuries for pediatric plastic referral are hand fractures, followed by burns and lacerations. **Keywords:** plastic surgery, consultation patterns, pediatric emergency medicine

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FEVER syndromic surveillance as a surrogate for pandemic H1N1 influenza in the emergency department

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Introduction: Early detection of disease outbreaks is important to public health and emergency department preparedness. This study demonstrates the utility of using fever for syndromic surveillance for early detection of influenza-like illness (ILI) during the 2009/10 influenza pandemic. **Methods:** Chief complaint (CC), review of systems (ROS), discharge ICD-9 code related to fever and ED temperature (T) defined as equal to or greater than 100.4°F were used as data streams. Data was collected from 11/01/08 through 11/01/09. Daily counts were converted to proportion of illness by dividing by daily total ED volume. A cumulative sum (CUSUM) algorithm using a 3 standard deviation threshold was used to generate alerts indicating aberrant fever activity. Alerts were also generated using linear regression (LM) analysis using the last 12-day proportion of fever before the day of interest. The slope of the line was used to determine the angle of rise or decline in fever activity with an alert threshold set at + 18°. Laboratory data was used to estimate the first confirmed cases of influenza during seasonal and pandemic waves. Timeliness to detection was determined by comparing syndromic surveillance alerts to the dates of laboratory confirmed influenza. **Results:** Alerts for fever occurred 10 days before a rise in laboratory confirmation of seasonal influenza activity using CUSUM-CC/ROS and LM-ROS. Alerts for fever occurred 11 days before a rise in laboratory confirmation of wave 1 of pandemic influenza for CUSUM-ICD/CC/T & LM-CC and 10 days prior with CUSUM-ROS & LM-ROS/T. Wave 2 generated alerts for fever 10 days before laboratory rise in influenza activity with LM-ROS and LM-T methods. **Conclusion:** Syndromic surveillance of fever may be used as a surrogate marker for influenza during the 2009/10 H1N1 influenza pandemic and may provide 10–11 days of early warning compared with laboratory confirmation of influenza activity. **Keywords:** syndromic surveillance, pandemic influenza, H1N1

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FACTORS affecting medical students' choice of emergency medicine residency training program

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Introduction: Many career factors and personal characteristics have been associated with a medical student choosing to pursue a career in emergency medicine (EM). These include lifestyle factors such as practice flexibility and schedule as well as clinical factors such as diversity of practice and interest in a hospital-based acute care environment. The objective of this study was to determine which factors differentiate students interested in the CCFP-EM residency training stream from those interested in the FRCPC program. **Methods:** An online, 47-item survey was distributed to all medical students enrolled at The University of Western Ontario for the 2008/09 academic year. Medical students interested in EM were asked to rank the 5 most important factors related to their choice of EM residency program from a list of 15 factors. **Results:** Of the 563 students, 403 (71.5%) completed the survey. Of the respondents, 178 (44.2%) expressed an interest in applying to an EM residency training program, with 85 (47.8%) interested in applying to the CCFP-EM program, 55 (30.9%) interested in applying to the FRCPC program and the remainder unsure about which EM program they would apply to. Medical students interested in CCFP-EM ranked family life as the number 1 factor influencing residency choice followed by control over work schedule, long-term patient relationships, desire to work in a rural area and burnout prevention. FRCPC interested students ranked expertise in EM as their primary influence followed by family life, control over work schedule, subspecialization opportunities and teaching opportunities. Additionally, perceived prestige/status was ranked higher among FRCPC interested students compared with CCFP-EM interested students as a factor influencing decision-making. **Conclusion:** Family life and control over work schedule

were ranked among the top 5 factors by both CCFP-EM and FRCPC interested groups and appear to be common priorities seen as benefits of an EM career. **Keywords:** residency selection, graduate medical education, CARMS

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RELIABILITY of the 2007 CTAS guidelines: interrater agreement from a community and academic emergency department

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Introduction: The Canadian Emergency Department Triage and Acuity Scale (CTAS) has been widely implemented in Canada since 1999. In 2007, an updated version of the CTAS guidelines was introduced. The objective of this study was to determine the reliability of the updated CTAS guidelines. **Methods:** A total of 78 triage nurses participated in the study; 53 (67.9%) nurses were from an academic teaching centre and 25 (32.1%) were from a small community emergency department. Nurses independently assigned triage scores to 10 paper-based, case scenarios consisting of vital signs, patient age, pain score and a general description of the reason for visit. For 5 scenarios, the CTAS score would have remained unchanged, while the other 5 scenarios would have been differently triaged based on the 2007 CTAS first order modifiers. Kappa statistics were used to measure interrater agreement. **Results:** There was a significantly higher level of agreement ($\kappa = 0.73$, 95% CI , quadratic-weighted $\kappa = 0.85$) for the 5 case scenarios which relied on the older, 2003 CTAS guidelines compared with the 5 scenarios where the 2007 guidelines would have suggested a different triage level ($\kappa = 0.50$, 95% CI 0.42–0.59, quadratic-weighted $\kappa = 0.54$). Community triage nurses had a higher level of agreement ($\kappa = 0.80$, 95% CI 0.70–0.89, quadratic-weighted $\kappa = 0.88$) for the 5 case scenarios which relied on the older guidelines compared with their colleagues at the teaching hospital ($\kappa = 0.71$, 95% CI 0.63–0.78, quadratic-weighted $\kappa = 0.83$). Similarly, for the 5 case scenarios where the 2007 CTAS guidelines would have suggested a different triage level, community nurses had a significantly higher level of agreement ($\kappa = 0.62$, 95% CI 0.48–0.76, quadratic-weighted $\kappa = 0.63$) compared with their colleagues at the teaching hospital ($\kappa = 0.45$, 95% CI 0.35–0.56, quadratic-weighted $\kappa = 0.50$). **Conclusion:** The study results may be useful to develop educational materials to strengthen reliability and validity for the updated 2007 CTAS guidelines. **Keywords:** CTAS, reliability, interrater agreement

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HIGH fidelity simulation to complement training in pediatric emergency medicine

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Introduction: Residents feel unprepared to lead the resuscitation of pediatric patients with life-threatening cardiorespiratory dysfunction. Opportunities to learn in the clinical environment are very limited yet residents are expected to graduate with these important skills. High fidelity simulation offers a unique and "safe" environment in which to practise and receive direct feedback on resuscitation performance. We incorporated a formative 2-hour high fidelity simulation workshop, focusing on crisis resource management, into the 4-week clinical pediatric emergency medicine rotation and surveyed residents on its utility. Residents also participate in 3 one-hour low-fidelity mock code sessions during the rotation — with the use of summative, objectives-based, short answer pretests to maximize learning and make the best use of instructor time. We aimed to determine if learners' perceived ability to manage pediatric resuscitation improved by taking the workshop. **Methods:** Residents undertaking a pediatric emergency medicine rotation at the Montréal Children's Hospital, between January 2009 and January 2010, were asked to complete an anonymous short questionnaire immediately following a high fidelity simulation workshop. Residents were predominantly from training programs in pediatrics, emergency medicine (FRCPC and CFPC programs), family medicine and anesthesia. Statements on the survey allowed responses of "completely agree," "agree," "uncertain," "disagree" or "completely disagree." **Results:** Ninety learners undertook the workshop and completed the questionnaire. All subjects believed the workshop was a positive learning experience (73 learners completely agreed and 17 agreed). More importantly, 56 learners completely agreed, and 33 agreed, they were better prepared to address a similar scenario in the ER with only 1 learner neutral to the question — no learner disagreed. **Conclusion:** High fidelity simulation workshops can improve learners' perceived ability to deal with similar scenarios in the clinical setting. **Keywords:** high fidelity simulation, pediatric resuscitation, education research

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TEACHING medical students to break bad news using simulation, role-play and interprofessional learning

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Introduction: Breaking bad news (BBN) is one of the most difficult tasks in medicine. Unfortunately, much evidence exists demonstrating that deficiencies in BBN are common, and that the repercussions of this communication breakdown are grave. This may be due, in part, to the previous lack of formal training in this area. This study describes an initiative by Queen's School of Medicine to design a course introducing second year medical students to BBN **Methods:** A total of 100 second-year medical students and 39 third-year nursing students participated in the pilot program. The course consists of 2 components: an online learning module and a small group session. Students first complete the online module, where they learn the SAD NEWS protocol for BBN. During the small group session students are surprised with a simulated cardiac arrest to immediately engage the learners. Following the unsuccessful resuscitation of the high fidelity mannequin, a clinician demonstrates a BBN interview with a standardized patient (SP). Students then role-play a BBN interview with a SP and receive structured feedback. Following the small group session, students complete a survey evaluating the course. **Results:** Evaluations showed that 93.3% of students agreed or strongly agreed that the session provided them with a clear and step-wise approach to BBN and 88.9% agreed or strongly agreed that the SP interview was a realistic and emotional experience. Finally, 73.3% of students agreed or strongly agreed that the cardiac arrest simulation helped them to realize some of the effects of their own emotions while BBN to a patient. **Conclusion:** This program used an innovative integration of an online educational tool, interprofessional small group learning, SP role-play, and high fidelity simulation to achieve its goal of teaching medical students to break bad news effectively and compassionately. An overwhelming majority of students found the session an effective and enjoyable way to learn the difficult skill of BBN. **Keywords:** breaking bad news, interprofessional learning, simulation training

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THE RADIATION casualty assessment tool: a new tool for the emergency department management of radiation disasters

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Introduction: Few Canadian emergency departments (EDs) consider

themselves prepared for a disaster involving radiation. To address this gap we developed a tool designed to provide background information to guide decision-making, highlight the clinical biodosimetry measures available acutely, and facilitate documenting important clinical information obtained during the history and physical exam. **Methods:** The initial version of the Radiation Casualty Assessment Tool (RCAT) was developed following a live exercise, MEDNEREX, which was held in the emergency department of the Queen Elizabeth II Health Sciences Centre in Halifax in October 2006. The tool was integrated into a 2-day course called METER (Medical Emergency Treatment for Exposure to Radiation). The course was given a total of 9 times over the following 2 years. At each course, the tool was presented, along with didactic presentations on radiation medicine, followed by a workshop during which participants were required to use the tool to manage cases. At 5 of those courses, questionnaires were completed by course participants to provide feedback on the utility of the Tool. These suggestions were incorporated into subsequent revisions of the tool. **Results:** A total of 62 questionnaires were returned from approximately 225 participants during 5 METER courses. The questionnaires did not identify the role of the respondent (i.e., whether they were a paramedic, ED clinical staff, Public Health or administration). The overall response score was 4.1 (on a scale of 1–5, with 1 being negative, 5 being positive). The score tended to improve with each revision of the tool. **Conclusion:** The Radiation Casualty Assessment Tool received high scores in terms of ease of use and usefulness for ED staff when assessing casualties during workshops involving radiation cases. Use of this tool may help address a lack of preparedness at many EDs for managing radiation disasters. **Keywords:** disaster medicine, Radiation Casualty Assessment Tool

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COMPARISON of physician assessment of pretest probability of heart failure to decision tools: experience within one regional health authority

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Introduction: Heart failure (HF) is a common presentation to the emergency department (ED) and clinical diagnosis can be a difficult. Tools such as the PRIDE scoring system and serum brain natriuretic peptide (BNP) have been proposed alone or in combination to improve diagnostic accuracy for ED patients with dyspnea. This study evaluated the accuracy of physician assessment to other methods for patients with suspected HF. **Methods:** Prior to ordering a BNP, physicians at 5 hospitals were required to complete a simple, intranet- or paper-based form that documented the following: 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. Patients with high (> 50%), moderate (15%–50%) and low (< 15%) PTP assessed by an ED physician were compared with calculated PRIDE scores and BNP, and the combination of both. Data are presented as proportions and median with interquartile ranges (IQRs); groups were compared using ANOVA. **Results:** Of 2780 BNP tests ordered, 1119 (40.2%, 95% CI 38.1%–1.8%) forms were completed. Overall, 807 (72%) were completed by ED physicians and included in this analysis. BNP was ordered in 45 (5.6%) patients whose HF PTP was low, 398 (49.3%) patients whose PTP was moderate, and 351 (43.5%) patients whose PTP was high. The median (IQR) PRIDE scores for low, moderate and high PTP were 4 (1, 7), 5 (4, 8), and 8 (6, 11), respectively ($p < 0.001$). The median PRIDE scores (without BNP) for low, moderate and high PTP were 2.5 (1, 4), 4 (3, 6), and 6 (4, 7), respectively ($p < 0.001$). The median (IQR) BNP levels for low, moderate and high PTP were 127.5 (68, 426), 377 (148, 1025) and 700 (316, 1498), respectively ($p < 0.001$). **Conclusion:** Compliance with BNP ordering was low. Physician PTP estimates were strongly associated with PRIDE score and BNP results. Despite recommendations, approximately 50% of BNP tests could be eliminated; the use of a PRIDE scoring system could assist ED physicians in BNP ordering. **Keywords:** brain natriuretic peptide, PRIDE scoring system, heart failure

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PREDICTORS of prolonged length of emergency department stay for CTAS level 1–3 patients

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Introduction: Emergency department (ED) length of stay (LOS) is an important performance indicator and increased ED LOS may worsen ED crowding and access block. A pay for performance model was created for regional EDs and provides incentive for both high and low acuity patients that are discharged within target times. The purpose of this study was to identify predictors of prolonged ED LOS (> 4 h) in high acuity (CTAS-1, -2 or -3) patients who were discharged home. **Methods:** This was an administrative database study undertaken from Feb. 1 to Dec. 1, 2009, in a tertiary care ED with greater than 60 000 visits per year. Patients triaged as CTAS 1–3 who were discharged home from the ED without spending time in our observation unit were included. Age, gender, arrival mode, arrival time (hour of day and day of week), triage level and location, time-to-MD assessment and all orders (laboratory, imaging, medication, ECG and consults) were extracted from the ED administrative database. Predictors of prolonged ED LOS were evaluated with multivariable logistic regression. **Results:** A total of 17 483 CTAS 1–3 patient visits occurred; 4964 (28.4%) had an LOS greater than 4 hours. The odds ratio (OR) for prolonged ED LOS was 4.61 (95% CI 4.1–5.26) if patients had any orders and 1.8 (1.67–1.95) if they arrived by ambulance, 1.59 (1.41–1.75) for CTAS 1–3, 4.53 (4.1–5.0) if a consult was ordered, 4.06 (3.68–4.47) if a CBC was ordered, 2.08 (1.92–2.25) for any imaging, 1.82 (1.68–1.97) if medication was ordered, 1.49 (1.43–1.55) for each 30-minute increase in time to MD assessment and 1.96 (1.77–2.16) if the patient was first triaged to the acute versus fast-track area. **Conclusion:** There are several independent predictors of prolonged ED LOS. These can broadly be grouped as patient specific (arrival mode, acuity level) or process specific factors (orders, consultation, CBC, imaging, location of patient placement in ED, medications given and time to MD assessment). The latter are potentially amenable to QI improvement initiatives. **Keywords:** administrative database study, ED length of stay

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CRISIS resources for emergency workers (CREW), Phase II: results from a pilot study and simulation-based crisis resource management course for emergency medicine residents

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Introduction: Resuscitation of a critically ill patient in the emergency department (ED) requires the coordinated efforts of an interdisciplinary team. Although effective aviation-based team training strategies are taught in other medical domains, there is currently no formal Crisis Resource Management (CRM) curriculum for Canadian emergency medicine (EM) trainees. We describe the piloting and multilevel evaluation of a novel, simulation-based CRM curriculum for EM residents, the CREW curriculum. **Methods:** Curriculum development was informed by a formal needs assessment survey of key EM stakeholders (CREW I). We constructed a 1-day CRM course using a blend of lecture, simulation scenarios and focused

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debriefing sessions facilitated by trained instructors. A subset of 10 residents was recruited to participate in a simulation-based assessment to evaluate if the CREW course improves resident performance in standardized pre- and postcourse scenarios; these were videotaped and scored by 2 blinded reviewers using a previously validated scale, the Ottawa CRM Global Rating Scale (GRS). To measure attitudinal shifts regarding CRM behaviours, residents completed the Human Factors Attitude Survey (HFAS) both pre- and posttraining, as well a postcourse survey. **Results:** Resident postcourse survey responses were highly favourable. The majority reported that CREW training will influence their practice and has the potential to reduce error and improve patient safety. Suggested areas for improvement include interdisciplinary training and shortening the length of instruction. Statistical analysis of the Ottawa GRS and HFAS did not demonstrate a significant difference in pre- and postcourse scores. **Conclusion:** EM residents find simulation-based CRM instruction to be highly effective and relevant to their practice. Future efforts should focus on interdisciplinary modes of EM team training and recruiting a larger sample size for pre–post comparison. **Keywords:** simulation training, residency training, survey study

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ABUSIVE versus nonabusive head injury in children: a systematic review

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Introduction: Abusive head injury is the leading cause of traumatic death in infancy. Studies have shown that up to one-third of abusive head injury is initially misdiagnosed as accidental by emergency department (ED) physicians. By identifying characteristic clinical and radiological features of abusive and nonabusive traumatic head injury we may be able to improve recognition of abuse by ED physicians. **Methods:** We searched electronic databases, Cochrane Library, conference proceedings, and reference lists to identify all comparative studies of children aged 6 years or younger with abusive or nonabusive head injury. Only studies in which children were admitted to hospital and that compared historical features, physical exam features or imaging findings were eligible. **Results:** A total of 485 citations were identified and 29 studies were included in the review. There was variability in the methods by which head injuries were deemed to be abusive — 1 study used determination by single MD, 1 required admission of abuse, 5 relied on multidisciplinary assessment, 6 relied on discharge diagnosis and 16 used a combination of criteria (e.g., witnessed abuse, history inconsistent with developmental stage). Inconsistency in the definition and reporting of clinical and imaging characteristics as well as high statistical heterogeneity presented challenges to meta-analysis. Notwithstanding these important limitations, there were 3 characteristics where odds ratios (ORs) for abusive versus nonabusive head injuries could be combined: subdural hemorrhage (pooled OR 10.5, 95% CI 7.2 to 15.2, 19 studies), metaphyseal fractures (12.7, 95% CI 2.9 to 55.3, 3 studies), and long bone fractures (3.7, 95% CI 1.8 to 7.7, 8 studies). **Conclusion:** This systematic review highlights the need within the child abuse research literature for greater consistency in the criteria used to identify head injuries as abusive or nonabusive and for greater consistency in examining and defining characteristics that may be associated with these injuries. **Keywords:** child abuse, head trauma, systematic review

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QUE-PASA: the Quebec panic attack screening aid for emergency department patients with unexplained chest pain

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Introduction: The objective of the present study was to develop and validate a screening questionnaire for panic-like anxiety in emergency department (ED) patients with unexplained chest pain (UCP). **Methods:** This multicentre study included 507 consecutive ED patients randomly assigned to the development condition (n = 201) or the validation condition (n = 306). In the development condition, logistic regression analyses were conducted to determine which of the socio-demographic, medical and questionnaire response variables best predicted presence of panic-like anxiety. The selected predictors were used to develop and validate a screening questionnaire. **Results:** The 4-item Quebec Panic Attack Screening Aid (QUE-PASA) screened panic-like anxiety with a sensitivity of 63.9% (95% CI 53%–73%) and a specificity of 81.2% (95% CI 72%–88%) in the development phase. Sensitivity and specificity were 54.6% (95% CI 46%–63%) and 82.3% (95% CI 76%–87%), respectively, in the validation phase. Comparative analyses revealed that the QUE-PASA was 6–10 times more sensitive to detect panic-like anxiety than ED physicians. **Conclusion:** The QUE-PASA has the potential to improve identification of panic-like anxiety in patients who consult in the ED for UCP. Prospective validation and impact analysis are required before clinical implementation. **Keywords:** chest pain, panic disorder, screening aids

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KETAMINE–propofol compared with propofol for procedural sedation in the emergency department

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Introduction: Propofol (P) and ketamine (K) are 2 commonly used agents in procedural sedation. The objective of this open-label pilot study was to compare time to recovery, total sedation time, complications, adverse events (AEs) and satisfaction scores when ketamine–propofol (KP) was used compared with P for ED procedural sedation. **Methods:** This prospective observational trial included adults (≥ 18 yr) presenting to an academic ED requiring procedural sedation. Physicians were assigned to use either KP or P for all procedural sedations performed over the study duration. KP patients received an initial dose of K 0.5 mg/kg and P 0.5mg/kg IV at time zero, followed by additional titrated doses of P 0.25–0.5 mg/kg IV administered every 60 seconds as needed to reach a predetermined sedation score. P patients received an initial dose of P 0.5 mg/kg IV, followed by additional titrated doses of P 0.25–0.5 mg/kg IV administered every 60 seconds as required. Oxygen was administered only as an intervention for hypoxia, and was not given preprocedurally. **Results:** Forty patients (21 KP, 19 P) were enrolled (July–September 2009). Mean recovery time in the KP group (7.7 min, 95% CI 5.9–9.5) was not different compared with the P group (8.5 min, 95% CI 6.1–10.9). Total sedation time in the KP group (14.5 min, 95% CI 11.5–17.5) was also not different compared with the P group (12.7 min, 95% CI 10.5–14.9). Thirteen (61.9%) patients in the KP group experienced intraprocedural AEs compared with 6 (31.6) in the P group (p = 0.07). Postprocedural AEs (nausea/vomiting, emergence reaction) were not different between the 2 groups (KP 3/21, P 2/19). There was no difference in patient, nurse or physician satisfaction scores. **Conclusion:** This small data set demonstrated the feasibility of sedation with KP and P regimens in adults who did not receive preprocedural oxygenation. Data gathered from this pilot study will be used to generate hypotheses for a future multicentred, randomized controlled trial involving K and P. **Keywords:** ketamine propofol, procedural sedation, pilot studies

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THE INFLUENCE of a system-wide strategy to reduce emergency department overcrowding on COPD care

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Rowe BH, Villa-Roel C, Willis V, Boyko D, Wing A, Lali P, Gaebert D, Bawden J, Anstett D, Crooks J, Montgomery C, Evans J, Sales A; ESSC Substudy Evaluation Group; University of Alberta, Edmonton, AB

Introduction: Emergency department (ED) overcrowding is one of the most pressing health care issues in developed countries. In 2006, the former Capital Health (CH) region implemented the Emergency Solutions and System Capacity (ESSC) project to address ED overcrowding and patient-flow issues. This study examined the effect of the ESSC on accepted quality of care markers for acute COPD at academic and community EDs. **Methods:** Four 6-month periods from January 2006 to December 2008 were examined (baseline, 6, 12 and 18 mo postintervention). Retrospective chart reviews were completed by trained research staff on a random selection of 400 patients/period with COPD to examine the quality of care. The outcomes were time to assessment and evidence-based care. Kruskal–Wallis and χ^2 statistics were used to compare different time periods. **Results:** Overall, 1933 patients were included and the groups were similar among the study periods. The median age was 71 years, more males presented (51%) and 26% were smokers. The median time to care decreased (83 v. 70 min, $p = 0.001$) over the study periods. Median time from triage to first corticosteroid ($p = 0.22$) and antibiotic (0.90) administration were unchanged. Approximately 50% of all patients seen in this region are admitted with COPD and the time from triage to admission increased over the study from 22 hours to 29 hours ($p < 0.001$). Time to discharge remained unchanged (6.5 h). **Conclusion:** The ESSC improved ED throughput for patients with COPD marginally; however, ED output, particularly for admitted patients remains problematic and increasing delays were observed. Additional interventions are required to ensure COPD patients receive appropriate care during exacerbations. **Keywords:** system-wide interventions, COPD, emergency crowding

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PACSUNU: problematic ambulatory care visits that are semi-urgent and nonurgent

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Introduction: The overcrowding problem of the ambulatory care section in the emergency department (ED) is clearly distinct from that of patients on stretchers (partially due to the extended stay of patients waiting for hospitalization). Several causes of patient overload have been described, particularly the lack of primary care resources for nonurgent cases, but very few studies have described how much they are involved in the problem. To describe an ambulatory population with a semiurgent or nonurgent medical problem in a university hospital ED, according to the evaluation of primary health care resources available and the patients' perception of the degree of urgency of their problem. **Methods:** A sample of patients was recruited at the CHA's Hopital de l'Enfant-Jesus ED from Jun. 16 to Jul. 31, 2009, using a convenient schedule from 8 hour–0 hour, including weekends. To be eligible, patients medical problem had to be classified as a P4 or P5 according to the CTAS. All participants were asked to answer a standardized questionnaire designed to assess the following: 1) their perception of the urgency of their medical problem at that time, 2) the known alternatives for primary health care resources, 3) attempts to use those resources. Most analyses were proportions calculations used to describe the situation and patients characteristics. Univariate analyses were done for comparison of some subgroups. **Results:** A total of 202 patients were recruited. Triage scale score had been P4 for 58% of them and P5 for 43%. Thirteen patients (6%) felt that their medical problem was "extremely urgent" while 107 (53%) considered it "urgent." Overall, 44% of patients have tried to consult outside of the ED. Among the 150 patients with a family physician, 57 (38%) have tried to consult somewhere else, compared with 11 of 52 patients (21%) without a family physician. **Conclusion:** The lack of front line resources may influence the overcrowding of the ambulatory care section in the ED, but the patients' perception seems to be a contributory factor at least as important. **Keywords:** nonurgent visits, emergency crowding, survey research

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IMPROVING access to emergency medicine grand rounds

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Introduction: Grand rounds are one source of continuing medical education for emergency physicians (EPs). Many EPs, especially those in rural areas, have difficulty accessing them. This study evaluated the acceptability and value of delivering grand rounds online in podcast format. **Methods:** EPs from southern Alberta were asked to complete a preintervention survey, listen/watch 2 grand rounds podcasts and complete a postintervention survey. The intervention was an audio or audio–video version of 2 resident grand rounds that were created using simple computer software. The rounds were distributed to EPs via a password protected website. **Results:** Of the 255 eligible physicians, 71 completed the initial survey and 31 completed the postintervention survey. A total of 23% of respondents practice in rural areas, 85% of respondents had listened to a podcast before and all but 1 (97%) listened to at least 1 of the study podcasts. In the initial survey, perceived barriers included time and familiarity with the technology, although in the postintervention survey the majority (90%) found the technology easy to use. Most physicians (77%) listened to podcasts on their home computer, and some (17%) listened while commuting. The majority of respondents (87%) thought that grand rounds podcasting was useful. Nearly half of physicians stated that they would change their clinical practice based on the information delivered in each podcast. **Conclusion:** Emergency medicine grand rounds podcasts can be successfully used to deliver practice-changing information to EP's in both urban and rural centres. These physicians rate grand rounds podcasts as highly useful. Despite the perception that they lacked familiarity with this technology, nearly all respondents found podcasts easy to use. Future plans include creating additional podcasts for wider dissemination. **Keywords:** didactic education, podcasts, continuing medical education

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THE INFLUENCE of a system-wide strategy to improve the care for patients with chest pain in the emergency department

Rowe BH, Villa-Roel C, Willis V, Boyko D, Wing A, Gaebert D, Bawden J, Anstett D, Crooks J, Montgomery C, Evans J, Sales A; ESSC Substudy Evaluation Group; University of Alberta, Edmonton, AB

Introduction: Chest pain is a common presenting symptom to emergency departments (EDs). Accepted quality benchmarks include time to ECG and evidence based care (especially ASA). Care delays due to overcrowding prompted the implementation of the Emergency Solutions and Systems Capacity (ESSC) project in 2006. This study examined the effect of ESSC on quality of care markers for chest pain in academic and community EDs. **Methods:** Four 6-month periods from 01/06 to 12/08 were examined (baseline, 6, 12 and 18 mo post-ESSC). A retrospective chart review was completed by trained research nurses on a random selection of approximately 750 patients/period with chest pain. Demographics, overcrowding metrics (time to ECG, time to ED MD assessment) and evidence-based care were compared using Kruskal–Wallis and χ^2 statistics.

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Results: Overall, 2872 patients were included; groups were similar among the study periods. The median age was 57 years and 56% were male. Overall, 31% presented by EMS and 65% were triaged as "cardiac" chest pain. Time from triage to MD increased for CTAS-3 cases (95 v. 104 min, $p = 0.006$). ECGs were performed in 94% of cases and the median time from triage to ECG was unchanged over the study period. ASA use increased (39 v. 44%, $p = 0.049$) and time from triage to ASA administration decreased over the study period (54 v. 37 min). Approximately 20% of patients were admitted to hospital and time from triage to floor transfer increased (12.1 v. 16.7 h, $p = 0.002$). Time to discharge for the majority of patients who are discharged increased during the study period (5.7 v. 6.8 h). **Conclusion:** The ESSC program did not significantly improve time to ECG and overcrowding prevented complex patients from being assessed rapidly. ASA use and administration timing decreased; however, admission delays increased. Additional efforts are required to improve the care of patients with chest pain in these EDs. **Keywords:** system-wide interventions, chest pain, emergency crowding

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THE ASSOCIATION between bicycle helmet legislation and the rate of cycling in Alberta, Canada

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Introduction: Legislating bicycle helmet use has been an injury prevention strategy used by many jurisdictions to prevent serious head and brain injuries among cyclists. There is debate regarding the influence of this intervention on cycling activities due to cost, inconvenience and fear of ticketing, thus counteracting efforts to promote healthy living. This study evaluated the effect of mandatory helmet legislation for ages under 18 years on bicycling behaviour among all age groups in Alberta. **Methods:** Two identical surveys were conducted in Alberta 2 years before and 4 years after helmet legislation. Cyclists were observed in randomly selected sites in Calgary, Edmonton and smaller communities around these 2 cities from June to October. Cyclists' general characteristics were recorded by trained observers and Canadian census data were used for demographic trends. Poisson regression analysis was used to obtain estimates of the cyclists per hour (CPH) and corresponding rate ratios (RR). We reported the results for both randomly selected sites (RSS) and revisited sites (RVS) in 2006 (in abstract only RSS). **Results:** On average, CPH rates for children was 3.46 in 2000 and 2.15 in 2006 (RR 0.62, 95% CI 0.56–0.68). The CPH rates among adolescents changed from 1.87 to 1.61 (RR 0.86, 95% CI 0.76–0.97) and among adults CPH rates changed from 6.12 to 4.71 (RR 0.77, 95% CI 0.72–0.82). Multiple regression analysis revealed that fewer children and adults were observed in 2006 than 2000 by 41% (RR 0.59, 95% CI 0.43–0.82) and 30% (RR 0.70, 95% CI 0.53–0.94), respectively. Adolescents were also observed similarly frequently in 2006 and 2000 (RR 0.83, 95% CI 0.58–1.19). **Conclusion:** From 2000 to 2006, cycling was estimated to decline among children. The evidence for adults was equivocal; estimates of adolescents CPH rates failed to indicate a similar decline. **Keywords:** cycling injuries, helmet legislation, bicycling behaviour

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DISCREPANT interpretation of emergency department radiographs

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Introduction: Discrepant interpretation of radiographs is a concern in every emergency department (ED) and an efficient process should be in place for dealing with them. The objective of this study was to determine the number and types of discrepancies in radiograph interpretation between emergency physicians (EPs) and radiologists, and the adequacy of patient follow-up. **Methods:** A retrospective medical record review was conducted by trained research personnel to determine the number of discordant radiograph interpretations from an academic ED within a 2-week period. Reports were classified as normal, abnormal but clinically insignificant, or abnormal and clinically significant. Abnormal reports were compared with the interpretation by the EP, and all discrepant cases were reviewed. The patient record was reviewed to determine the ED management and the type of follow-up. The total number of discrepant reports, mean time to dictation of reports and physician compliance in dealing with discrepancies was also assessed. **Results:** A total of 1192 consecutive plain film radiology reports were reviewed. Of these, 347 (29.1%) were classified as significant. Interrater reliability was tested in 20% of the reports and was found to have a Cohen κ of 0.96. Mean (SD) time from the exam to the discrepancy report was 12 (8) hours and time from posting of the discrepancy to EP acknowledgement was 30 (21) hours. The EP interpretation was discrepant in 21 (6.1%) cases and not documented in 238 (68.6%) of the 347 abnormal cases. Of the 21 discrepant cases, all had proper follow-up; 7 of the 21 cases were noted as discrepancies because there was no EP interpretation at the time of the radiology interpretation. **Conclusion:** Although all plain film discrepant reports were managed appropriately, several films had no EP interpretation. Due to the delay in radiology interpretation and transcription, it is important for EPs to enter their interpretation to prevent a review of the patient record days later and optimize patient care. **Keywords:** emergency radiography, discrepant interpretations, patient safety

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OUTCOMES of allergist follow-up after emergency department visit for anaphylaxis

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Introduction: Anaphylaxis guidelines recommend allergist follow-up for all patients who have experienced anaphylaxis from an allergen that may be encountered in a nonmedical setting. The utility of allergist follow-up after an emergency department (ED) visit for anaphylaxis is unknown. We analyzed outcomes of allergy follow-up after ED evaluation for anaphylaxis. **Methods:** An observational cohort study of ED patients with symptoms of anaphylaxis from April 2008 to May 2009 was conducted. Data was collected on presentation and follow-up. Statistical analysis was performed using JMP 8. **Results:** The study sample included 202 patients. The median age of the study group was 33 years, 120 (59.4%) were female and 51 (25.2%) were younger than 18 years. Among the 202, 95 (47%) had allergy follow-up after the ED visit. Of the 95 patients, 74 (77.8%) underwent allergy testing (skin tests, radioallergosorbent tests or both). Of the 74 patients tested, 55 (74.3%) had an allergen identified and 19 (25.7%) had negative or inconclusive results. Among the 74 patients who underwent allergy testing, 63 (85.1%) had a specific allergen suspected during the ED evaluation, 11 (14.8%) had unknown allergens in the ED. Among the 63 with a specific allergen suspected, 43 (68.2%) had confirmation of the allergen that was suspected during the ED evaluation, 7 (11.1%) had a different allergen identified and 13 (20.6%) had inconclusive results. Among the 11 patients with an unknown allergen in the ED, 6 (54.5%) had an allergen identified. **Conclusion:** Most patients who followed up with an allergist had an allergen identified by allergy testing. This suggests that allergy follow-up after an ED visit for anaphylaxis is useful and supports current anaphylaxis guidelines. **Keywords:** anaphylaxis, specialty follow-up, allergy testing

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THE IMPACT of Rapid Assessment Zones/Pods (RAZ/RAP) on ED overcrowding: a systematic review

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Introduction: Rapid assessment zones (RAZ) or pods (RAP) are interventions designed to reduce emergency department (ED) overcrowding by improving patient throughput. The aim of this study was to determine the available evidence for RAZ/RAP and summarize their influence on ED overcrowding metrics. **Methods:** Electronic databases (Cochrane Central Register of Controlled Trials, MEDLINE, Embase, Web of Science, HealthSTAR, Dissertation Abstracts, ABI/INFORM Global), controlled trial registry websites, conference proceedings, study references, experts in the field and correspondence with authors were used to identify potentially relevant RAZ/RAP studies. Interventional studies in which RAZ/RAP was used to influence ED overcrowding metrics (length of stay [LOS], left without being seen [LWBS]) were included in the review. 2 reviewers independently assessed the citation relevance inclusion and study quality. Weighted mean differences were calculated and reported with corresponding 95% confidence intervals. **Results:** From 14 716 potential relevant studies, 4 were included in the systematic review. Two projects were published as abstracts; 1 was a journal publication and 1 was a report. All studies were single-centred ED studies and targeted throughput processes. Two studies were controlled trials; the overall quality of the research was moderately strong due to the presence of high quality designs. Overall, 3 studies reported data on ED LOS and demonstrated a significant reduction in ED LOS compared with the control group. One study found decreased ED LOS in triage category 4 patients while no change in triage category 2, 3 or 5. There was a small reduction in LWBS for this intervention group. **Conclusion:** While RAZ/RAP intervention may be a promising alternative for overcrowded EDs, the available evidence required to implement it is limited and weak. Additional efforts are required to report RAZ/RAP interventions using high quality research methods. **Keywords:** rapid assessment zones, emergency crowding, systematic review

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THE CLINICAL epidemiology, management and long-term outcomes of emergency department patients with atrial flutter

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Introduction: Acute atrial flutter (AFL) is the second most common arrhythmia seen in the emergency department (ED). Little published research describes treatment, disposition and long-term outcomes of patients with acute AFL. **Methods:** We searched the ED administrative database of 2 urban hospitals to identify consecutive patients with a discharge diagnosis of atrial flutter (ICD 10 I48.1). We linked each patient's unique health number to the provincial vital statistics registry and to regional ED databases to identify subsequent hospitalizations, deaths and strokes. Manual chart review identified patient comorbidities, rhythms and outcomes. Index visits were stratified into 6 groups based on initial ED presentation or management: no action taken, AFL due to underlying acute medical cause, spontaneous conversion, rate control, rhythm control or DC cardioversion. Outcomes included index visit admission, stroke or death at 1 year, and ED visits related to AFL within 1 year. **Results:** Over a 3-year period, 134 patients were enrolled; 14 patients had no ED action attempted (0% conversion, 7.1% admission) and 18 patients had an acute precipitating cause of AFL (11% conversion, 100% admission). Fifteen patients converted spontaneously and were discharged from the ED, 28 had ED rate control (0% conversion, 28.6% admission), 17 had chemical cardioversion (58.1% conversion, 47.0% admission) and 42 underwent DC cardioversion (72% conversion, 7.1% admission). One patient (0.8%, 95% CI 0.0 – 2.2%) had a hemorrhagic stroke during the index admission, 4 (3.0%, 95% CI 0.0 – 5.9%) died of nonthromboembolic causes within a year. During the follow-up period, 63 patients (47%) had 145 visits related to AFL with 38 admissions. All 5 patients with stroke or death had serious underlying acute comorbidities. **Conclusion:** In a 2-centre ED cohort of AFL patients, most were discharged after conversion to sinus rhythm, assuming no underlying acute medical cause. One-year rates of stroke and death were low and unrelated to AFL. **Keywords:** atrial fibrillation, long-term outcomes, population research

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DOES voluntary hyperventilation cause electrocardiographic abnormalities in emergency department patients with chest pain or dyspnea?

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Introduction: Patients frequently present to emergency departments (EDs) with chest pain or dyspnea and require testing for cardiac ischemia. Approximately 25% of such patients ultimately meet criteria for panic disorder. This condition is frequently associated with hyperventilation and is often unrecognized by emergency physicians. The electrocardiogram (ECG), a primary diagnostic tool in differentiating cardiac from noncardiac conditions, is influenced by ventilation status. Our objective is to determine the prevalence of hyperventilation-related electrocardiogram changes in patients presenting with chest pain or dyspnea, and to compare this to a matched cohort of control patients. This should allow determination of the nature and frequency of ECG changes in patients with hyperventilation syndrome, and reveal how hyperventilation may confound the diagnosis of chest pain or dyspnea. **Methods:** Subjects with chest pain or dyspnea will be compared with controls with noncardiopulmonary complaints. All consenting patients will undergo a baseline 12-lead ECG and pCO_2 determination (using a nasal capnometer). Patients will be instructed to hyperventilate until a 10 mm Hg drop in pCO_2 occurs, at which point the ECG will be repeated. Patients will report symptoms experienced during hyperventilation. Two ED physicians blinded to ECG timing and ventilation status will identify hyperventilation-related ECG changes using an explicit classification scheme. Statistical proportions and 95% confidence intervals will be reported, and the significance of observed outcome differences will be determined using a Pearson χ^2 test for 2 proportions. Logistic regression analysis will be used to identify predictors of hyperventilation-induced ECG changes. **Results:** Enrolment is ongoing and data will be available for presentation. **Conclusion:** These data will assist emergency physicians in determining the significance of ST and T wave changes seen in patients presenting with syndromes that are compatible with ACS or anxiety. **Keywords:** hyperventilation, electrocardiography, panic disorder

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CLINICAL decision rule to identify patients seen in the emergency department for mild traumatic brain injury who are at risk of persistant postconcussion symptoms

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Introduction: Mild traumatic brain injury (MTBI) is defined by an altered state of consciousness of 30 minutes or less, a Glasgow Coma Scale (GCS) score of 13 to 15 in the emergency department (ED) or by the presence of a posttraumatic amnesia lasting 24 hours or less.

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During the initial assessment in the ED, the investigation is primarily focused on identifying patients at risk of short-term complications, particularly those requiring neurosurgery. However, there is no existing clinical decision rule to identify patients at risk of developing persistent symptoms. The purpose of this study is to develop a clinical decision rule to identify at an early stage the patients at risk of developing persistent symptoms after 3 months, to facilitate a clinical orientation for proper monitoring of nonhospitalized MTBI. **Methods:** Patients were recruited in 5 level I and II trauma centre EDs in the province of Quebec. All patients were referred for a systematic telephone follow-up after 1 week, 1 month and 3 months. The assessment was done with the Rivermead Post Concussion Symptoms Questionnaire. Logistic regression analysis and recursive partitioning were used. **Results:** A total of 409 MTBI patients were recruited and only 19 of them were lost at follow-up. Of the 390 responding patients, 33.7% described persistent symptoms at 3 months. Three predictive models were developed, offering sensitivities of 80%, 90% and 97%, and specificity of 60% 75% and 72%, respectively. **Conclusion:** The 3 models each offer a high sensitivity and specificity. A prospective validation of these rules and the interobserver reliability for each risk factor are needed before choosing the best model and recommending its use as a clinical decision rule. **Keywords:** mild traumatic brain injury

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AN ANONYMOUS unlinked seroprevalence study of HIV and hepatitis C in urban Canadian emergency departments

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Introduction: This study was designed to determine the prevalence of blood-borne pathogens (HIV and hepatitis C [HCV]) and distinguish between known and previously unrecognized infections in the emergency department (ED) setting. **Methods:** A prospective cross sectional study enrolled consecutive patients seen at 3 urban Canadian EDs, aged 15–54, from whom a complete blood count was drawn. Waste/left over blood was prospectively collected and serotested for HIV and HCV after removal of all personal identifiers. HIV and HCV seroprevalence was calculated. Univariate and multivariate analyses were performed to identify factors associated with HCV and HIV infection. This 2006 study replicated previous (1998) methodology for the analysis of waste blood specimens. **Results:** Of 3487 enrolled patients, 1663 (47.7%) were male and 333 (9.5%) were First Nations. In 2006, 53 (1.5%, 95% CI 1.1–1.9) were HIV infected, of which 50 (94.3%) were previously known and 43 (81.1%) were HCV co-infected. In 1998, 1.3% of patients were HIV seropositive, 82% were previously known to the laboratory or HIV clinic and 69% were HCV co-infected. In 2006, 303 (8.7%, 95% CI 7.8–9.6) patients were HCV seropositive with 241 (79.5%) previously known. In 1998, 9.8% of patients were HCV seropositive and 44% were previously known to be infected. Previous knowledge of HIV ($p = 0.06$) or HCV ($p < 0.0001$) in the health care system has increased between study periods. HIV and HCV seropositivity were associated with co-infection, age 30–44 years, First Nations status, receiving social assistance and male sex. There were no HIV seropositive subjects under 20 years of age, and HCV prevalence was 0.4% in this age group. **Conclusion:** HIV and HCV prevalence were stable between testing periods; however, awareness of HCV and HIV has increased. HIV and HCV prevalence is strongly associated with disadvantaged populations, yet the low rate of youth seroprevalence suggests interventions have been effective. Targeted interventions should be continued. **Keywords:** HIV, HCV, seroprevalence study

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CIRCUMSTANCES of injuries to cyclists resulting in emergency department visits in Toronto and Vancouver

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Introduction: Bicycling is a sustainable mode of transportation with population and individual health benefits, but the risk of injury deters many people. We studied injured cyclists from 2 urban areas to characterize injury severity and mechanism. **Methods:** Multicentre (3 Toronto and 2 Vancouver EDs), 18-month prospective study of injured adult cyclists. Data on injury circumstances were obtained via patient interview. CTAS data were retrieved from hospital records. Here we report descriptive data and comparisons between cities on the circumstances of the first 300 injury events, 150 in each city. **Results:** The median CTAS score was 3 (interquartile range 3–4, $n = 228$). Of the 300 cyclists studied, 27 (9.0%, 95% CI 5.8%–12.2%) were admitted to hospital. Injury mechanism was broadly classified as collision in 213 cases (70.9%, 65.9%–76.1%) or fall in 87 (29.1%, 23.9%–34.1%). Collisions involved motor vehicles in 102 cases (34.1% of all events, 28.6%–39.4%), streetcar or train tracks in 46 (15.4%, 10.9%–19.0%), curbs, fences or barriers in 38 (12.7%, 8.3%–15.7%), pedestrians or other cyclists in 14 (4.7%, 2.3%–7.1%), potholes in 9 (3%, 1.1%–4.9%), and animals in 3 (1%, 0%–2.1%). Manoeuvres to avoid collisions, mainly with motor vehicles, pedestrians or other cyclists, resulted in 28 falls (9.3% of all events). The proportions of injuries involving motor vehicles were almost identical in the 2 cities, but the odds of an event involving "dooring" were higher in Toronto than Vancouver (OR 2.83, 95% CI 1.13%–7.02). Toronto events were more likely to involve streetcar tracks (OR 19.6, 5.9–65.0) and less likely to involve pedestrians or cyclists (OR 0.33, 0.13–0.83) than those in Vancouver. **Conclusion:** The injury circumstances and the differences between cities suggest that transportation infrastructure and interactions with motorized and nonmotorized traffic are important (and potentially modifiable) factors in cycling injuries. **Keywords:** cycling injuries, motor vehicle accidents, injury circumstances

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OCCURRENCE, timing of short-term serious outcomes in syncope patients and emergency physicians' ability to predict them in a Canadian tertiary care emergency department

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Introduction: Most decision rules for ED syncope patients are derived to predict outcomes within 7 days. The aim of this study was to estimate the occurrence of serious outcomes from 8 to 30 days and to evaluate the emergency physicians' (EPs') ability to predict outcomes occurring outside the ED within 30 days. **Methods:** We conducted an 18-month chart review in a tertiary care ED to include adults with syncope (sudden loss of consciousness with complete recovery) and excluded those with altered mental status, substance abuse, seizure, head or severe trauma. We reviewed records at all local adult hospitals and coroner's offices for timing of outcomes. A second blinded EP confirmed all outcomes. We abstracted information on referrals made in the ED and as an outpatient. If patients with serious outcomes were not referred in the ED or follow-up not arranged before outcome occurrence, then the EP was deemed to have missed the outcome. We calculated predictive parameters for the EP with 95% CIs. **Results:** Of 915 visits screened, 436 patients were included (50.3% female, mean age 58.5 [SD 22.5] yr). A total of 9.7% sustained serious outcomes (death 1.0%, arrhythmia 4.6%, myocardial infarction 0.2%, pulmonary embolism 0.8%, significant hemorrhage 1.6%, stroke 0.2%, procedures to treat etiology of syncope 6.1%, hospitalization for related event 1.0% and condition causing return ED visit 0.4%) with 5.3% occurring after ED discharge (3.3% as inpatients,

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2.0% outside the hospital). Of the outcomes, 37.1% occurred at 8–30 days. Sensitivity and specificity of the EP to predict outside ED outcomes were 70.4% and 79.4% (95% CI 52.3%–83.9% and 78.3%–80.2%). Missed outcomes were as follows: 2 deaths, 3 arrhythmias, 1 stroke and 2 hospitalizations on return visit. **Conclusion:** This is the first study to identify the significant risk in ED syncope patients after 7 days which EPs should be aware of. EPs in our setting missed a significant proportion of outcomes highlighting the need for a decision rule for ED syncope patients. **Keywords:** syncope, clinical prediction rules, delayed adverse outcomes

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FOMEPIZOLE versus ethanol in the treatment of toxic alcohol intoxication: a systematic review

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Introduction: Toxic alcohol ingestions are a cause of significant morbidity and mortality, but are easily treated with inhibition of the enzyme alcohol dehydrogenase (ADH). Two drugs are commonly used to achieve ADH blockade — fomepizole and ethanol. To date, no head-to-head trial has been carried out to compare the 2 treatments in terms of efficacy, patient safety, and resource utilization. **Methods:** A comprehensive search of the literature, using PUBMED and Embase databases, was carried out. All studies describing the treatment of patients with acute methanol or ethylene glycol with either ethanol, fomepizole or both, were included. The articles were used to collect, where possible, individual patient data including type and serum level of toxic alcohol ingested, presence of coingestions, duration from ingestion to treatment, treatment drug (ethanol or fomepizole), and treatment dosage, as well as patient outcome. Specifically, need for and duration of hospital admission and ICU admission, need for and duration of renal replacement therapy and any adverse effects related to the toxic ingestion or ADH blockade were reviewed. **Results:** Initial search yielded 1235 papers. Initial review based on title and abstract resulted in 352 papers, and after review of full articles by 3 authors using a priori inclusion criteria, 137 papers were included in the data analysis. Data on over 500 cases of toxic alcohol ingestion have been collected. Data from these 500 + cases will be summarized and presented, comparing treatment protocols in terms of efficacy, safety and use of resources. **Conclusion:** A randomized, controlled trial comparing ethanol and fomepizole for treatment of toxic alcohol ingestion does not exist in the current literature. Potential conclusions drawn from this review will include a clear advantage of the use of either fomepizole or ethanol for ADH blockade, in one of the above-listed areas. **Keywords:** fomepizole, toxic alcohols, systematic review

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EMERGENCY physicians' intention to use a clinical decision rule to safely cease monitoring of patients with suspected acute coronary syndrome: a study of psychosocial determinants

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Introduction: A validated clinical decision rule (CDR) in the monitoring of suspected acute coronary syndromes (ACS) in the emergency department (ED) may lead to better clinical outcomes and improved resource utilization. Emergency physicians (EPs) opinions regarding this approach are presently unknown. **Methods:** A 2-step approach was realized. 1) A focus qualitative study was conducted among 25 EPs to identify their beliefs regarding the use of a based on the Theory of Planned Behaviour. 2) Then, a questionnaire assessing the determinants of the intention to perform the behaviour was build using identified beliefs. Socio-demographic and professional variables were also measured. Multiple email survey invitations were sent to members of the Quebec Association of Emergency Physicians (n = 500). Linear regression analysis was subsequently used to assess determinants. **Results:** A total of 112 EPs (22.4%) completed the online questionnaire. EPs' intention to use a CDR to safely cease monitoring of patients with suspected ACS is high (mean of 4.2 on a 5-point scale). The main factors predicting intention are subjective norm (β = 0.26), attitude (β = 0.23), and perceived barriers (β = –0.30). Control variables (age, gender, clinical experience, work status, type of hospital, region) have no effect on intention to use a CDR. However, the proportion of variance in intention explained by the theoretical model remains limited (R^2 = 0.36). **Conclusion:** Results from this preliminary study will inform the development of interventions that aim at implementing a validated CDR to support EPs' decisions regarding patient monitoring. Based on these results, a larger survey will be conducted across Canada. These results could thus be helpful for designing interventions adapted to local contexts that would facilitate the implementation of the CDR in EPs' practice. **Keywords:** cardiac monitoring, clinical decision rule, barrier analysis

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UNPLANNED emergency department and hospital admission following minor injuries in independent elders

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Introduction: Independent community elders suffering from minor injuries are possibly at risk of short-term (3–6 mo) functional decline after an emergency department (ED) evaluation. This may lead to related-increase use of ED resources. Our objective was to evaluate the magnitude of post-ED visits and admissions in independent elders with minor injuries. **Methods:** Design: A retrospective study of community elders visiting a university-affiliated level 1 trauma centre in 2008 was conducted. Patients aged 65 years or older, evaluated in ED for minor injuries were randomly extracted from clinical-administrative databases. Patients' charts were reviewed with a standardized data collection sheet. Independent status was confirmed before review. Identification of Seniors at Risk (ISAR) score was calculated. Interobserver agreement was confirmed. Outcomes: Unplanned ED visits and hospital admissions related to the initial injuries within 3 months after the index ED visit. Analysis: Outcomes were compared according to preplanned age categories (group 1: 65–74 yr; group 2: 75–84 yr; group 3: ≥ 85 yr) using χ^2 tests. **Results:** Out of the 294 patients chart reviewed, 220 (75%) were discharged from ED after their initial assessment. Age categories distribution was as follows: 106 in group 1 (48.1%), 79 in group 2 (35.9%) and 35 in group 3 (15.9%). Discharge proportions were equivalent across groups (p = 0.68). Twenty-eight patients (12.7%) were referred to community services. The ISAR score was 2 or less in 86.3% of patients. Of the patients, 124 (56.3%) had at least one subsequent unplanned ED visit over 3 months; 63 visits (50.8%) were considered related to the initial minor injuries and 23 patients (18.5%) were consequently admitted to hospital. No significant statistical differences in outcomes were found between age categories. **Conclusion:** One out of 4 independent elders with minor injuries have unplanned-related new ED visit over 3 months. Subsequent hospital admissions are frequent although patients ISAR scores were low. **Keywords:** geriatrics, unplanned revisits, minor trauma

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LOW probability ventilation-perfusion scans in the emergency department: the frequency and results of follow-up Doppler venous ultrasonography

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Introduction: Pulmonary embolism (PE) is an important clinical entity presenting to the emergency department (ED), and is responsible for significant morbidity and mortality if undiagnosed. Ventilation–perfusion (V/Q) imaging continues to be used as an imaging modality in the evaluation of suspected PE. Current literature suggests nondiagnostic V/Q scans (low or intermediate probability) should be followed with Doppler venous ultrasonography to rule out deep venous thrombosis (DVT) of the legs before excluding PE. **Methods:** A retrospective chart review was conducted by trained research personnel for all adult patients who received ED-ordered V/Q imaging for suspected PE over a 6-month period at an academic tertiary care centre. The interpretation of each V/Q scan was recorded, along with D-dimer level and Doppler venous ultrasonography result of the low probability scans. **Results:** Of 262 patients who had ED-ordered V/Q imaging to rule out PE, 155 had low probability interpretations. Of these, 86 (55.48%) went on to receive Doppler venous ultrasonography of the legs while 69 (44.52%) did not. Of the 86 patients who had a Doppler venous ultrasound, 85 (98.84%) were negative and 1 (1.16%) was positive for the presence of a DVT. Patients were more likely to receive a Doppler ultrasound if a D-dimer measurement was abnormal (> 400 μg/L), compared with patients without a D-dimer measurement or a normal D-dimer measurement (61.5% v. 46% and 53%, $p = 0.008$). **Conclusion:** Approximately half the patients with low probability V/Q scans went on to receive Doppler ultrasonography, suggesting that current algorithms to rule out PE are not being used. When Doppler ultrasonography was performed, 98.8% of scans were negative for DVT, suggesting that this step may not be a cost effective manoeuvre in patients with low probability V/Q scans. Further study incorporating pretest clinical probability would be beneficial to fully evaluate the utility of Doppler venous ultrasonography in the setting of low probability V/Q scans. **Keywords:** venous thromboembolism, ventilation perfusion scanning, Doppler ultrasonography

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MEDICAL students' attitudes toward Canadian emergency medicine residency training programs

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Introduction: Canada has 2 distinct emergency medicine (EM) training programs governed by 2 different colleges, the Royal College of Physicians and Surgeons of Canada (FRCPC) and the Canadian College of Family Physicians (CCFP-EM). The objective of this study was to determine medical students' attitudes toward the 2 EM training streams. **Methods:** An online, 47-item survey was distributed to all medical students enrolled at The University of Western Ontario for the 2008/09 academic year. The survey asked questions pertaining to topics such as the need for 2 training streams, competency of graduates and the length of the 2 programs. **Results:** Of the 563 students, 403 (71.5%) completed the survey. Of the respondents, 178 (44.2%) expressed an interest in applying to an EM residency training program, with 85 (47.8%) interested in applying to the CCFP-EM program, 55 (30.9%) interested in applying to the FRCPC program and the remainder unsure about which EM program they would apply to. Ninety-three (52.2%) respondents felt there should continue to be 2 EM residency training programs. Ninety-nine (55.6%) students believed that FRCPC graduates are more competent than CCFP-EM physicians upon graduation; however, 125 (70.2%) students believed both are equally competent after 5 years of practice. Fifty-seven students (32.0%) felt that the FRCPC program should be shorter, 52 (29.2%) felt that it should remain the same length. With regard to the CCFP program, 48 (56.5%) CCFP-EM interested students felt that the program length was adequate; however, 32 (58.2%) FRCPC interested students felt that the program should be longer. Finally, 41 (48.2%) CCFP-EM and 24 (43.6%) FRCPC interested students felt that it was not acceptable to train in the CCFP-EM stream and practice full time EM. **Conclusion:** Controversy exists not only among physicians, but among EM interested medical students with regard to Canada's 2 different EM residency training streams. **Keywords:** residency program selection, EM training streams, survey research

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PROCEDURAL sedation and analgesia in a Canadian emergency department: a time-in-motion study

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Introduction: Some patients presenting to the emergency department (ED) suffer from conditions that require potentially painful treatment; procedural sedation and analgesia (PSA) are an important component of their management. The purpose of this study was to determine the resources associated with the administration of PSA to ED patients. **Methods:** A prospective observational study collected detailed data on the dosage of PSA medications, adverse events and ED times on patients requiring PSA for treatment of fractures, reductions of major joint dislocations and cardioversion for atrial fibrillation at an academic hospital between July 2007 and December 2009. Patients with chronic health conditions and those under 17 years of age were excluded. Descriptive analyses included proportions; means (with SD) and medians with interquartile ranges (IQRs). **Results:** Of the 177 PSA considered for the analysis, 123 (69.5%) were orthopedic manipulations and 54 (30.5%) were cardioversions. The mean age was 54 years and 54% were female. Propofol alone or combined with fentanyl were the most commonly administered medication (86%), and 27 (15%) self-limited and minor adverse events were documented. The median number of staff used in each PSA was 4 (IQR 4–4). The median time from triage to the start of the PSA procedure was 175 (IQR 98–259) minutes. The median from the end of monitoring to discharge was 186 min (IQR 104–316) minutes. The median time from the start of PSA administration to the end of patient monitoring was 12 minutes for fractures/dislocations and 7 minute for cardioversions. The total ED length of stay was 6.6 hours. **Conclusion:** PSA is a brief and safe intervention that requires the coordination of a variety of ED staff; delays in procedures represent opportunities to reduce ED overcrowding. Variations in practice within and among hospitals suggest guidelines may assist clinicians and institutions with standardization. **Keywords:** procedural sedation

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A QUALITATIVE evaluation of the implementation, operation and sustainability of 7 clinical decision units in Ontario's pilot program

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Introduction: We conducted a qualitative evaluation of Ontario's Ministry of Health (MOH) pilot Clinical Decision Unit (CDU) program, examining implementation, clinical operations and sustainability at 7 acute care hospitals. **Methods:** In-person semistructured interviews were conducted with ED and hospital staff from CDU implementation teams at 8–12 weeks postimplementation; and again at 12 months. Teams included physicians, clinical directors, nurses, IT/decision support staff and senior hospital administrators. Interviews were recorded and transcribed. Observation exercises, CDU care pathway documentation and follow-up telephone interviews were also conducted. Qualitative data were analyzed using grounded theory, observation and content analysis. **Results:** Clinical (20) and administrative (11) staff participated. Key to successful implementation were executive

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support; change management experience by teams, ED physicians and the entire organization; and a shift in clinical and operational practice in the ED via communication and engagement strategies with staff that stressed the quality of care and patient centred foundations of the CDU. Effective CDU operations (utilization/patient flow) relied on physician engagement, nursing support, development/implementation of clinical care pathways, improved documentation and resources including administrative, diagnostics and discharge planning. Long-term MOH funding support and commitment, and moderate adjustment to defined MOH operational guidelines were highlighted as paramount to sustainability and expansion of the program. **Conclusion:** The implementation of CDUs is a complex process, resulting in no single clinical care or operational model, and requires adequate resources, operational procedures and ancillary services to support an efficient unit. This qualitative assessment complements a quantitative analysis of CDU use and ED outcomes; however, long-term evaluation of effectiveness is required. **Keywords:** clinical decision units, CDU implementation, qualitative research

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WHAT is the comfort level of community emergency physicians when performing pediatric procedures?

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Introduction: Aside from tertiary care centres with pediatric emergency departments (EDs) staffed by pediatricians, most pediatric emergencies are treated by community emergency physicians (EPs) and family physicians. Pediatric procedures and emergencies may be associated with more apprehension than similar adult situations. The objective of this study was to determine the comfort levels of community EPs in performing pediatric procedures in various community EDs. **Methods:** An online survey was distributed to 92 physicians working in 7 southwestern Ontario community EDs. Participants were asked to rate their level of comfort on many common pediatric procedures on a 5-point scale (1 = very uncomfortable to 5 = very comfortable). They were also asked to comment on what they perceived to be the biggest barriers in achieving comfort in these skills and possible ways to overcome these obstacles. **Results:** Forty-six physicians (50%) completed the survey. Over 45% were either very or somewhat uncomfortable with procedures such as the following: lumbar puncture (birth to 4 yr), chest tube placement (birth to 11 yr), central line placement (birth to 11 yr), VP shunt tap and suprapubic tap. Over 70% were very comfortable with bag mask ventilation (12–16 yr), procedural sedation (12–16 yr), reduction of shoulder and radial head dislocations and foreign body removal from ear. The top 5 skills physicians wanted to have more comfort in performing were lumbar puncture (birth to 4 yr) (48.9%), central line placement (birth to 4 yr) (44.4%), needle cricothyrotomy (42.2%), IV placement (birth to 4 yr) (40.0%) and rapid sequence intubation (birth to 4 year) (33.3%). **Conclusion:** Community EPs feel comfortable in performing most pediatric procedures; however, there is still a great deal of discomfort in performing many critical care skills. The infrequent need to perform these skills, lack of training in residency and strong pediatric back-up, are some reasons cited for this lack of comfort. **Keywords:** pediatric procedures, community physicians, procedural confidence

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CREATION of a clinical education guideline for undifferentiated chest pain assessment for junior learners: a methodological framework

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Introduction: Educating junior learners in best evidence-based clinical practice is essential to optimize clinical and self-education skills. We present a framework for creating a novel clinical education guideline (CEG) targetted at junior EM learners for the assessment of undifferentiated chest pain (UCP) patients in the ED. **Methods:** The EM faculty of McMaster University was surveyed to elicit a list of sentinel diagnoses felt to be essential for junior EM learners to address when assessing UCP patients. The 5 included diagnoses were ischemic heart disease, pulmonary embolism, thoracic aortic dissection, community-acquired pneumonia and pneumothorax. CEG questions included key assessments (history/physical), diagnostic tests and initial ED treatments for those diagnoses. The literature was searched for published guidelines/policies, Cochrane/other systematic reviews, and other high quality literature sources to answer these questions. Recommendations were stratified using the GRADE criteria. The CEG was written using AGREE reporting standards. The CEG was validated among junior learners, EM residents, EM faculty and non-EM academic/clinical experts. The CEG is being implemented into the EM clerkship curriculum at McMaster University. **Results:** A methodologically sound and valid CEG targeted at junior learners for the assessment of undifferentiated chest pain has been created, validated and implemented. **Conclusion:** The methodology for creating educational CEGs targeted at junior learners has been successfully created and implemented in a face valid fashion. This methodology can be used in the future to created CEG materials for junior learners across all specialties of medicine, and to create a nationally standardized EM curriculum for medical students in Canada. **Keywords:** clinical education guideline, GRADE, AGREE

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USING CTAS chief complaints to categorize emergency department visits

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Introduction: Although 13% of Canadians visit an ED each year, limited data are collected on the reasons for these visits. Chart review can be used to collect ED visit data but is expensive and time consuming. Discharge diagnoses are not always available at the time of an ED visit. CTAS chief complaints are collected electronically at triage at many institutions and may be suitable for public health surveillance or to provide an estimate of resource utilization by disease category. Our objectives were to use CTAS chief complaints to categorize ED visits and to provide suggestions on how to enhance this data with other information available at time of triage. **Methods:** CTAS chief complaints were categorized a priori into 3 broad categories: injury, medical and psychosocial. Injuries were subcategorized as multitrauma, single system, minor cutaneous (lacerations, abrasions, stings or bites), poisonings and environmental. Medical complaints were subcategorized by organ system. Using this classification, we analyzed 2008 administrative data from 3 urban EDs in Metro Vancouver. **Results:** Of 130 553 visits, 27 489 (21.1%) were for an injury (6.9% multitrauma, 54.7% single system trauma, 32.6% minor cutaneous injury, 4.7% poisoning and 1.0% environmental injury). Medical problems accounted for 98 031 visits (75.1%). The 5 most common medical subcategories were neurologic (16.5%), GI (14.1%), dermatological (12.1%), CVS (10.8%) and MSK (10.3%). Ten percent of the medical visits could not be categorized into an organ system. Psychosocial problems accounted for 4980 (3.1%) visits. The average (median) length of stay was 3.2 (2.1) hours for injuries, 5.0 (3.1) hours for medical complaints and 8.5 (5.4) hours for psychosocial complaints. **Conclusion:** CTAS chief complaints can be categorized to provide an overview of the reasons for ED visits. Routine collection of additional information available at time of triage — such as mechanism of injury — would provide more useful information for use in public health surveillance. **Keywords:** CTAS, chief complaint classification, public health surveillance

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VARIATION of minor injury patterns in independent elders seeking medical evaluation in emergency department

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Introduction: The patterns of injuries, resource allocation and profiles of independent elders suffering from minor injuries have been so far underevaluated. Our objective was to compare profiles between elders and older elders presenting at ED. **Methods:** Design: A retrospective study of independent elders presenting at a university-affiliated level 1 trauma centre in 2008 was conducted. Charts of patients' aged 65 years and more who were evaluated in ED for minor injuries were randomly extracted and reviewed with a standardized data collection sheet. Interobserver agreement was insured. Outcome: The proportion of types, mechanisms and clinical characteristics of injuries between age groups (1: 65–74 yr; 2: 75–84 yr; 3: ≥ 85 yr). Analyses between groups comparisons were conducted using χ^2 and t tests. **Results:** Two hundred and ninety-four charts were reviewed, 141 (48%), 104 (35%) and 49 (17%) in groups 1, 2 and 3, respectively. The proportions of women significantly increased from group 1 to 3, 51%, 68%, 78%, respectively ($p < 0.01$). Patients in group 1 were more likely living at home alone or with a partner (90% v. 53%, $p < 0.01$). A simple fall was the most frequent mechanism of injury across all group (61%, 82%, 86%, respectively). A motor vehicle accident was significantly more prevalent in the younger group (10% v. 2%, $p < 0.01$). Distribution of injuries were similar over all categories; contusion (51%) and uncomplicated fracture (42%) being more frequent. Overall, 25% of patients were admitted in each group ($n = 74$). Only 77 patients (27%) were assessed by community services while in the ED to evaluate independent status. This proportion was similar across groups. **Conclusion:** Socio-demographic and mechanisms of injuries are significantly different between elders and older elders with minor injuries, while admission proportions and evaluation by community services were equivalent. The reasons for and the functional consequences of such discrepancies should be investigated. **Keywords:** geriatrics, injury patterns, independent elders

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PRACTICE variation in bronchiolitis management in Ontario community emergency departments

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Introduction: Bronchiolitis is the most common lower respiratory tract infection during infancy. Little is known about the bronchiolitis management in community hospital emergency departments (EDs) and in-patient wards. **Methods:** Our objective was to describe bronchiolitis management in community hospitals. We retrospectively reviewed a consecutive cohort of infants aged 12 months or younger with bronchiolitis who presented to 28 Ontario community hospital EDs over 2 years. A single reviewer abstracted data. Bronchiolitis was defined as first episode of wheezing associated with signs of an upper respiratory tract infection during RSV season. Primary outcome was hospital admission. Secondary outcomes included medication usage and investigations. **Results:** A total of 953 infants were identified, 543 (57%) were eligible; 327 (60%) were male, mean age was 5.8 (SD 3.8) months; 176 (32%) were admitted with rates ranging by site from 0% to 73%. Medication usage varied by site. In the ED 76% of patients received salbutamol (MDI/nebulized), 20% oral steroids, 17% ipratropium bromide, 16% inhaled steroids, 7% antibiotics and 6% nebulized epinephrine. For admitted patients, 92% received salbutamol, 31% inhaled steroids, 31% antibiotics, 26% oral steroids, 18% epinephrine and 3% ipratropium bromide. Among patients discharged from the ED, 36% were discharged on salbutamol MDIs, 15% on inhaled steroids, 13% on antibiotics, 11% on oral steroids and 7% on oral albuterol. Among admitted patients 33% were discharged on salbutamol MDIs, 30% on inhaled steroids, 19% on oral antibiotics, 16% on oral albuterol and 15% on oral steroids. During their ED visit, 56% of all patients had chest x-rays, 23% had viral studies, 6% had at least 1 blood test and 1% had urine cultures. Among admitted patients, 30% had chest x-rays, 33% had viral studies, 20% had at least 1 blood test, and 2% had urine cultures during admission. **Conclusion:** There is variation in bronchiolitis management. Infants continue to receive medications and investigations for which there is little evidence of benefit. **Keywords:** practice variation, bronchiolitis, knowledge translation

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INTENSITY of anticoagulation with warfarin and risk of adverse events in patients presenting to the emergency department

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Introduction: To evaluate the intensity of anticoagulation with warfarin and the risk of bleeding and thromboembolic complications in patients presenting to the emergency department (ED). **Methods:** A prospective, observational study was performed using a convenience sample of patients receiving warfarin and presenting to the ED over an 18-week period. Data was collected using a standardized data collection form and included chief complaint, history of present illness, past medical history, medication history and allergy status. Information from the physical examination, laboratory results and diagnostic tests, all obtained as part of routine assessment in the ED, were used as necessary. The primary outcome was the proportion of patients within, above or below the desired therapeutic range for International Normalized Ratio (INR). Bleeding complications and thromboembolic events were recorded in an attempt to determine the relationship between the intensity of anticoagulation and adverse outcomes. **Results:** A total of 201 patients were included with a mean age (standard deviation) of 74.0 (13.2) years and 53.7% were female. Primary indication for warfarin was atrial fibrillation (80.1%) and venous thromboembolic disease (14.9%). A therapeutic INR was observed in 88 patients (43.8%, 95% CI 36.9%–50.6%), while 45 patients (22.4%, 95% CI 16.6%–28.2%) and 68 patients (33.8%, (95% CI 27.3%–40.4%) had subtherapeutic and supratherapeutic INR, respectively. Overall, there were 27 bleeding complications (13.4%, 95% CI 8.7%–18.1%) (17 major and 10 minor) and 4 thromboembolic events (2.0%, 95% CI 0.1%–3.9%). Among patients with a bleeding complication 13 (48.1%) had a supratherapeutic INR while 2 (50.0%) patients that experienced a thromboembolic event had a subtherapeutic INR. **Conclusion:** The majority of patients presenting to the ED on warfarin had INRs outside the desired therapeutic range. Optimizing warfarin therapy in this patient population may prevent adverse outcomes such as thromboembolic and bleeding events. **Keywords:** anticoagulation, warfarin, bleeding events

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CCFP-EM interested medical students intend to better blend their family medicine practice with their emergency medicine practice than previous cohorts

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Introduction: Previous studies have reported that the majority of

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recent CCFP-EM graduates practise mostly emergency medicine (EM) rather than blending their practice with family medicine (FM). Some have argued that 2 years of FM training is a waste of resources for physicians who intend to practice full time EM. The objective of this study was to determine the degree to which CCFP-EM interested medical students intend to blend their FM and EM practices. **Methods:** An online, 47-item survey was distributed to all medical students enrolled at The University of Western Ontario for the 2008/09 academic year. Medical students who identified themselves as interested in the CCFP-EM program were asked how much time they wished to spend in FM and EM after residency. **Results:** Of the 563 students, 403 (71.5%) completed the survey. Of the respondents, 178 (44.2%) expressed an interest in applying to an EM residency training program, with 85 (47.8%) interested in applying to the CCFP-EM program. Of the 85 students interested in the CCFP-EM stream, 38 (44.7%) reported that they intend to practise "mostly FM" while 29 (34.1%) indicated they intend to practise "half FM and half EM." Fifteen (17.6%) CCPF-EM interested medical students responded that they intend to practise "mostly EM" and 2 (2.4%) reported that they intend to practise all EM. Thirty-four (40.0%) respondents believed that it is acceptable for residents to complete the CCFP-EM stream with the intention of practising solely EM, while 41 (48.2%) thought this is unacceptable. **Conclusion:** The majority of students interested in the CCFP-EM program intend to practise "mostly FM" or "half FM and half EM." Future studies should determine whether this current cohort of medical students does indeed better blend their 2 areas of clinical practice and, if so, what factors differentiate them from previous cohorts who practise mostly EM. **Keywords:** family medicine stream, blended practice, survey research

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THE INFLUENCE of a system-wide strategy to improve emergency department treatment of acute myocardial infarction

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Introduction: Acute ST-segment elevation myocardial infarction (STEMI) is a time-sensitive and critical condition presenting to emergency departments (EDs). Accepted standards of care include time to ECG, thrombolysis (TL) and percutaneous coronary intervention (PCI). This study examined the influence of the Emergency Solutions and Systems Capacity (ESSC) project on achieving benchmarks as well as compared the prehospital STEMI care under the new Vital Heart Response (VHR) service. **Methods:** Prospective and retrospective data collections were completed by dedicated nurses on all patients with STEMI. Five 6-month periods from January 2006 to April 2009 were examined (baseline, 6, 12, 18 and 24 month post-ESSC). Baseline demographics were compared; overcrowding metrics (time to ECG, time to ED MD assessment) and evidence-based care (time to TL and/or PCI) were assessed. Kruskal–Wallis and χ^2 statistics were used to compare different time periods. **Results:** Overall, 1176 patients were included and the groups were similar among the study periods. The median age was 59 and 76% were males; 42% presented via ambulance. Self-arrival time to ECG increased from 7 to 11 minutes during the study period. Prehospital TL remained stable at approximately 5%. Median time from triage to TL for self-referred patients remained above standards throughout the study (46 v. 50 min). Use of PCI over the study increased from 45% to 56% ($p = 0.025$). Time from triage to PCI improved with EMS arrival (102 v. 85 min) but remained stable for self-arrival (158 v. 148 min). Time to TL, time to PCI, and time to TL and/or PCI were shorter with ambulance compared with self-arrival. Complications were rare and death occurred in approximately 3.8% of cases. **Conclusion:** The VHR improved prehospital STEMI care; however, the ESSC program did not improve the in-ED delivery of care for STEMI. Additional efforts are required to address the hospital-based delays in these Canadian institutions. **Keywords:** system-wide interventions, acute myocardial infarction, emergency crowding

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COMMUNITY Emergency Medicine Outreach (CEMO): regional needs assessment for clinicians practising in nonurban areas

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Introduction: Rural physicians identify significantly higher needs for emergency medicine (EM) continuing medical education (CME) than their urban counterparts. We surveyed rural physicians in order to develop a new needs-based regional outreach education program in adult EM. **Methods:** We conducted a multisite (12 hospitals) written needs assessment survey of all rural emergency physicians in our health region. Emergency department (ED) chiefs were offered a different survey designed to discover physicians' unperceived needs and characteristics of the community EDs. Participants rated a list of potential EM CME topics, generated from the text by Tintinalli, results of a preliminary needs assessment survey of Chiefs and the CanMEDS Roles applied to EM. Data analysis included frequency counts of all respondents and characteristics of the community ED groups. **Results:** Response rates were 7/12 (58.3%) for chiefs, and 72/165 (43.6%) for physicians working in rural hospitals in the health region. Participant hospitals had annual ED visits from 21 000–29 000; number of emergency physicians per hospital ranged from 10 to 18. Participants had graduated from medical school a mean of 16.4 years (range 1971–2006). Certifications included the following: 41/72 (56.9%) for CCFP, 10/72(13.9%) for CCFP(EM), 3/72 (4.2%) for FRCP(EM) and 6/72 (8.3%) for anesthesia. On average, respondents spend 42% (range 10%–100%) of their professional time in emergency medicine (74.6% full-time and 25.3% part-time). Nine clinical domains had scores greater than 100: musculoskeletal, resuscitation, neurology, cardiovascular, environmental, gastrointestinal, endocrine, shock and obstetrics/gynecology. The top 3 topics outside of the Medical Expert role included the following: administration, medico-legal and scholarship. **Conclusion:** This needs assessment survey identified key topics to guide the professional development of community physicians. Academic emergency medicine departments can perform an important role in the design of regional EM outreach CME programs. **Keywords:** community emergency medicine, continuing medical education, needs assessment

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FREQUENT users of an inner city emergency department

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Introduction: Within the emergency department (ED) patient population there is a subset of patients with a high number of frequent visits. Despite being small, this subset generates an inordinately high number of visits and disproportionately consumes ED resources. This retrospective chart review seeks to characterize this recidivist population to identify strategies to reduce the causes of these frequent ED visits. **Methods:** The frequent user was defined as a patient with 15 or more ED visits over a 1 year period. The details of each patient visit including demographics, entrance complaint, discharge diagnosis, method of arrival, Canadian Emergency Department Triage and Acuity Scale (CTAS) score, and length of stay in the ED were extracted and analyzed. Data from the entire ED population for the same period was used for comparison. **Results:** The review identified 92 patients

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who generated 2390 ED visits (out of 25 523 patients and 44 204 visits). This population was predominantly male (66%), middle-aged (median 42 yr) with no fixed address (27.2%). Patients arrived by ambulance 59.3% of the time and with less acute CTAS scores than the general emergency population. Substance use accounted for 26.9% of entrance complaints and 34.1% of discharge diagnoses. Increased lengths of stay were associated with female gender and abnormal vital signs, whereas shorter stays were associated with no fixed address and substance use ($p < 0.05$). Admission rates were lower than the general population and women were twice as likely as men to be admitted ($p < 0.05$). Patients left without being seen in 15.8% of visits. **Conclusion:** Highly frequent ED users are a unique population more likely to be male, younger, marginally housed and to present secondary to substance use. Admission rates among this population are low, and most patients are discharged home to the environment perpetuating the cycle of ED visits. Interventions aimed at addressing homelessness and substance abuse would potentially decrease visits and improve the overall health of this population. **Keywords:** frequent users, inner city care, predictors of utilization

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CHALLENGES encountered in an international medical project in Romania: an experience in resident driven initiatives to develop resident education abroad

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Introduction: The Romania Emergency Medicine Project is an ongoing international medical project aimed at assisting the main academic emergency department (ED) in Cluj-Napoca, Romania. In May 2008, a small team from Canada travelled to Romania. One of the many objectives of this trip was to perform a needs assessment of the residency education program. Although emergency medicine (EM) is a young specialty in Romania, there exists a large, nationally accredited 5-year postgraduate medical training program. At the time of the project, the EM residency in Cluj had more than 30 residents with 1 chief resident locally and a national program director in Bucharest. **Methods:** This needs assessment consisted of a review of the residency curriculum and access to educational resources through direct discussions with local residents, staff physicians and administrators. **Results:** The following problems with the local residency program were identified collaboratively: lack of a local program director and administrative assistant, no formal educational program, no formal staff mentors, no resident involvement in academic projects and poor access to EM resources. These issues were addressed both in Cluj by the Canadian team as well as in Toronto, when the Romanian ED chief and chief resident visited as part of a knowledge exchange program. Since the completion of the project, many positive changes have occurred including the designation of a local program director, introduction of a new academic half-day and improved access to EM resources. **Conclusion:** The issues with the Romanian EM residency in Cluj were multifactorial, involving complex organizational, cultural and resource-based problems. Despite the above, many positive changes occurred with more changes anticipated in the future. **Keywords:** international EM, Romanian EM, residency training

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DESCRIPTIVE study about prescriptions of narcotics and postanalgesic clinical monitoring of patients at the emergency department of a university hospital

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Introduction: Between 60% and 80% of patients who visit the emergency department are in pain. Narcotics are often the first choice of analgesics to avoid oligoanalgesia. However, their improper use can lead to respiratory depression and possibly death. The objective of this study was to describe the prescription of intravenous narcotics and clinical monitoring of patients receiving treatment in the emergency department (ED) of a university hospital. **Methods:** Retrospective analysis of the records of patients over 18 years of age who received intravenous narcotics after a diagnosis of renal colic or urolithiasis in the ED. We performed descriptive analysis on data on prescription and postanalgesia monitoring derived from patient files. **Results:** A total of 107 randomly sampled records were reviewed. A titration of opioids was initially prescribed in 63.8% of cases, but administered as prescribed in only 23.1% of them. The vital signs most commonly monitored pre- and postanalgesia were blood pressure (91.9%) and heart rate (92.3%). Paradoxically, oxygen saturation, respiratory rate and the level of sedation were respectively recorded in 79%, 50% and 3% of the cases. Finally, the reassessment of pain 0–30 minutes after analgesia was only performed in 75% of the cases. **Conclusion:** In this retrospective chart review, titration of intravenous analgesics seem to be rarely administered exactly as prescribed. Furthermore, the most important vital signs to check after the administration of a narcotic (respiratory rate, oxygen saturation) and the level of sedation are not routinely recorded on files. Following this study, a standardized protocol including the systematic use of the Richmond vigilance-agitation scale for the level of sedation was established. A phase II study is planned to assess the postimplantation impact. **Keywords:** descriptive analysis, narcotics

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MANAGEMENT of community-acquired pneumonia in a rural emergency department

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Introduction: Pneumonia is a common presentation to emergency departments (EDs) across Canada. Evidence based consensus guidelines exist to assist in the management of pneumonia. No studies to date have evaluated conformity to these guidelines in rural EDs. We proposed to evaluate community-acquired pneumonia management in a rural ED and to investigate the adherence to consensus guidelines with respect to choice of antibiotic and patient admission. **Methods:** A retrospective chart review was conducted on patients diagnosed with pneumonia in a small rural ED. Demographic information for each case was collected. The type of antibiotic, route of antibiotic administration, disposition at discharge from ED, hospital length of stay, diagnostic investigations ordered in the ED and patient comorbidities were analyzed. **Results:** A total of 628 charts were reviewed. Patients who were under 18 or who were already on antibiotics for pneumonia at the time of presentation were excluded from the study. The final sample consisted of 393 patients whose median age was 68 years (54.20% men). Patients received antibiotics either orally (83.46%), intravenously (14.25%) or both (1.53%). Of those patients who were treated as outpatients, 69.96% received a first or second choice antibiotic according to consensus guidelines. Of those who were admitted, 71.30% received treatment with a first or second choice antibiotic regimen that was in accordance to the guidelines. The admission rate was 29.26%, 1.27% of patients were transferred to another facility and 69.47% of patients were treated as outpatients. Median length of hospital stay for admissions was 4 days. **Conclusion:** Community-acquired pneumonia management guidelines are being followed in a rural ED with respect to antibiotic administration and hospital admission for the majority of cases. However, almost one-third of patients with pneumonia may not be treated according to the guidelines and may reflect an area of continuing medical educa-

tion for rural ED physicians. **Keywords:** community-acquired pneumonia, rural emergency medicine, descriptive analysis

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PHYSICIAN efficiency is no different between credentialed and noncredentialed emergency physicians in emergency medicine ultrasonography

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Introduction: The impact of emergency medicine ultrasonography (EMUS) on physician efficiency (PE) is unknown but is perceived as a barrier to performing EMUS. The objective of this study was to determine physician efficiency based on credentialing criteria in EMUS. **Methods:** Anonymous PE audits that are performed on a regular basis at a tertiary care urban academic emergency department were reviewed. Target number of patients seen per hour was calculated for each physician based on the type and number of shifts completed during the audit period (urgent care v. observation v. resuscitation and weekday v. weekends and nights). This was then compared with the average number of patients that would have been seen for that particular distribution of shifts by the average physician. PE was compared relative to being above or below the individualized target number. Those physicians within 10% of their target number were considered average. Physicians were then stratified based on their EMUS credentialing level (level 0: no experience; level 1: at least an introductory US course; level 2: credentialed). Descriptive statistics were used. **Results:** Forty-four emergency physicians (EPs) were audited in September 2008 and January 2009. The overall average number of patients seen per hour was 2.51 (September 2008) and 2.48 (January 2009). EPs were stratified according to efficiency (below, average, above) and credentialing (level 0,1,2). There were 7, 24 and 13 EPs credentialed at levels 0, 1 and 2, respectively. September 2008 EPs at each level 0, 1 and 2 were considered average efficiency of 29%, 54% and 92%, respectively. There was little difference for January 2009 with average efficiency of 100%, 79% and 92% for levels 0, 1 and 2, respectively. **Conclusion:** There is little difference in physician efficiency based on EMUS credentialing levels and over time between EMUS credentialing levels. The perception of decrease in physician efficiency with EMUS should not be a barrier to EMUS credentialing. **Keywords:** emergency ultrasound, physician efficiency, credentialling

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AN EXPERIENCE in patient advocacy by rural emergency physicians after major services cuts: the case of Nelson, BC

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Introduction: Government's efforts at cost containment through regionalization may lead to reduced emergency support services increasing patient risks while stretching the limits of the Canadian Health Care Act. Front-line emergency physicians may feel compelled to advocate for their patients. Few published reports on physician advocacy experiences pertaining to rural EDs exist. **Methods:** A qualitative case report by former ED physicians and local obstetricians/gynecologists describing advocacy experience at Kootenay Lake Hospital in Nelson, BC. In 2002, the BC government eliminated the general surgical program and closed the ICU. Since then, over 6000 patients travel yearly for specialty care and CT to the closest regional hospital in Trail, BC, 73 km away (1 h, 14 min). **Results:** Since July 2008, the regional hospital has been unable to provide ICU coverage on average 10 days per month. The closest ICU is then in Kelowna, (447 km) or Vancouver (662 km). The situation has led to increased transfer times with associated adverse events. We repeatedly informed health authorities of the potential hazards and proposed solutions. As these issues were not even considered through administrative channels, and, with unanimous support of the medical staff, we publicly exposed the situation. The details, risks and benefits of this process will be discussed. Ultimately, the situation has contributed to reduced morale and resignation of several full-time ED physicians. To date, few improvements have materialized, and KLH remains with the only ED its size in BC (12 000 visits/yr) serving a population of 30 000 without a CT, surgeon and adequate regional ICU coverage. **Conclusion:** Patient advocacy can be a complex, time-consuming experience with mitigated results. We still urge EP to use their expertise to better inform health authorities as well as the general public when administrative decisions compromise emergency care. We call on interested professional organizations and academic centres to provide objective review of the situation. **Keywords:** rural emergency medicine, patient advocacy, service cuts

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RETROSPECTIVE analysis of medevacs to the emergency department in Yellowknife

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Introduction: The Northwest Territories has a geographic area roughly the size of Ontario with less than 0.5% of Ontario's population. Providing high quality emergency health care in this enormous and vastly unpopulated region requires a substantial portion of the Territorial Ministry of Health's budget spent on medical travel, disproportionately on medevacs (urgent aeromedical evacuations). The purpose of this study is to identify those demographic and basic clinical criteria that are associated with the need for medevacs. **Methods:** Specific data from medevacs and scheduled flights (delayed urgent repatriation) from remote communities within the Northwest Territories to the emergency department in Yellowknife from April 2006 to August 2009 were reviewed. The following criteria were recorded for each patient: age of the patient, location of sending practitioner and accepting hospital, nature of illness/injury, time of day of call, nurse versus physician sending patient. To compare the 2 groups, statistical analysis was performed using ANOVA for quantitative data and a χ^2 test for qualitative data. **Results:** A total of 1215 medevacs and 755 scheduled flights to the Stanton Territorial Emergency Department were performed during the study period. Several characteristics were identified that are more strongly associated with medevacs: older age, internal medicine required and patient location. Other factors are more strongly associated with delayed urgent repatriations: orthopedic or plastic surgery patients. All criteria are presented in table form with their respective odds ratios. **Conclusion:** This study identifies criteria most strongly positively associated and negatively associated with medevacs. These criteria will assist in improving the decision-making process with respect to medevacs. Combining some of these criteria with particular clinical factors could form the basis for derivation of a robust decision rule to assist in the decision process. **Keywords:** medical evacuation, rural emergency medicine, retrospective review

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ELDERLY perceptions as to why they come to the emergency department by ambulance while emergency physicians judge it unnecessary

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Introduction: According to the literature, 35% to 68% of elderly persons' ambulance transports are deemed unnecessary by health professionals, but few studies researched why those persons choose to

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come by ambulance to the emergency department (ED). This study aimed at identifying predisposing and facilitating factors bringing the elderly to request ambulance transport. **Methods:** Our qualitative study included patients 65 years or older transported by ambulance to the ED at their request and whose transport was judged unnecessary by the attending EP. Information about the project was largely distributed to our EP and a phone number was posted in working areas soliciting EP to call for a research assistant if they cared for such a case. Recruitment was performed over a 2-week period, Monday to Friday, from 8:00 am to 4:00 pm. A 30-minute semistructured interview was conducted with the patient at the moment of discharge to collect information about predisposing and facilitating factors having led to the decision to call for an ambulance. **Results:** During the study, 8 unnecessary transports were reported and 1 woman and 4 men agreed to be interviewed. One patient was 68 years old and 4 were aged from 82 to 87. The major predisposing factor to the decision to call for an ambulance was the patient's own perception of a worsening health condition. Other factors included mobility issues and the distance patients had to travel, which varied from 16 to 65 km. **Conclusion:** This small interview-based study suggests that perception of a worsening health condition and transport issues play an important role in the use of ambulance in our elderly population. In order to formerly address those issues, larger population-based studies with systematic evaluation of contributive factors are warranted. **Keywords:** geriatrics, prehospital transport, ED misuse

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INIMAPA: investigation by medical imaging in patients with acute appendicitis

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Introduction: The increasing use of imaging in the assessment of abdominal pain has improved the diagnostic performance, but many doubts persist about the consequences of the widespread use of these modalities. The aim of our study is to evaluate the impact of radiological imaging modalities on treatment delays in patients with proven acute appendicitis and to detail many time intervals from the patient's arrival in the ED to the operating room. **Methods:** Retrospective study in 230 patients with diagnosis of acute appendicitis, grouped according to their imaging modality: clinical assessment only, ultrasound or CT scan. The time between the patient's arrival and the following events was analyzed: medical assessment, radiological investigation, obtaining imaging results, phone call to the surgeon, consultation by the surgical team and beginning of surgery. Different clinical data were also noted. **Results:** The median total time (h) for patients with clinical assessment only was 5.6 hours, though it was 9.9 hours for the CT scan group and 11.6 hours for the ultrasound group. The delays of assessment by the emergency physician were clinically similar in all groups and were, respectively, 0.8 hours, 0.8 hours and 0.6 hours ($p = 0.04$). The time devoted to the radiological assessment was 3.8 hours for the CT scan and 3.4 hours for the ultrasound ($p < 0.0001$). The delay from the surgical consultation was significantly longer for the CT scan and ultrasound groups, compared with the clinical assessment only (respectively, 5.1 h, 4.8 h and 2.2 h) ($p < 0.0001$)). **Conclusion:** In this study, the use of CT scan and ultrasound imaging was associated to longer delays before the surgery for the acute appendicitis. On the other hand, the elongation of these delays does not seem entirely due to the time required by the imaging procedure itself. **Keywords:** abdominal pain, imaging strategies, throughput analysis

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INNOVATED pediatric chest tube insertion bench model simulation: the usability of the pilot model

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Introduction: Acute morbidities of chest tube insertion (CTI) are directly related to poor acquisition of key tasks, specifically psychomotor and visual–spatial skills. Pediatric emergency practitioners infrequently perform this procedure and previous teaching models have been limiting and do not completely address their learning needs. A curriculum based simulation bench model was developed and piloted on pediatric residents and emergency fellows. **Methods:** Physicians in pediatric surgery and critical care were asked to identify the most challenging steps in the insertion of a chest tube based on the ATLS procedural checklist for CTI. As a part of quality improvement project, a model was developed which addressed these steps as well as the traditional components of CTI. The pediatric CTI simulation bench model was piloted for 2 procedural training sessions at the Hospital for Sick Children, in 2008 and 2009. Participants' self reported attitudes toward the usability of the model as a task trainer were captured using a 5-point Likert score. **Results:** The survey response rate was 75% (24 of 32 participants). Of the respondents, 90% recommended this model for skills training, 79% voted that it was better or superior to previous models, and 87.5% reported improvement the 2 challenging steps dissecting the intercostal space and tube positioning in the thoracic cavity. Respondents either agreed or strongly agreed that they now have the knowledge (95%) and are comfortable performing CTI for life saving purposes (83%). **Conclusion:** Pediatric trainees found the CTI Pediatric Model to be a usable teaching tool which was highly recommended, superior to previous models, and improved their comfort with the procedure. Further studies to validate the model are needed. **Keywords:** chest tube insertion, simulation training, pediatric emergency medicine

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EXPERIENCE of a tertiary pediatric emergency department responding to a pandemic H1N1 influenza surge

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Introduction: Surges of the new pandemic H1N1 influenza virus activity impacted our tertiary care pediatric emergency department (ED) (2008 census 53 667) during the spring of 2009, with a more significant second wave in the fall. Despite modifications to our hospital pandemic response plan following the first wave, considerable real-time adaptation and deviation from the plan were required during the second wave to maintain timely service. **Methods:** Electronic institutional databases were used to track the impact of the wave 2 influenza surge as it evolved. This allowed daily, and sometimes hourly, adjustments to the pandemic response in conjunction with regional and institutional responses. **Results:** During the period from Oct. 14 to Nov. 15, 2009, we saw a 50% increase in patient census (compared with 2008) with a peak day of 353 patients (143% increase). Fifty-one percent of patients required isolation for febrile respiratory illness (FRI) (peak 71%) and 28% met the definition of influenza-like illness (ILI) (peak 42%). Original plans called for a second ED space to maintain services for nonpandemic patients. The large volume of patients with mild H1N1 disease severity led us to implement an independent 24/7 FRI clinic in a clinical area adjacent to the ED. This was staffed by ED and non-ED personnel redeployed from the hospital. ED leadership met daily to evaluate and adjust our pandemic response. Just-in-time education, treatment algorithms, rapid assessment forms and preprinted orders were quickly developed and implemented to maximize efficiency and standardize workflow processes. These interventions

allowed us to maintain and even improve wait-time indicators despite this unprecedented surge. **Conclusion:** Real-time adaptation and modification of the hospital pandemic response plan is required to deal with prolonged surges in volume/acuity. Lessons learned can be applied to future surges or mass-causality events. ED redevelopment should consider the ability to rapidly expand operations into adjacent space. **Keywords:** H1N1, pandemic influenza, administrative database research

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DIAGNOSTIC approach to pulmonary embolism in a rural emergency department

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Introduction: Pulmonary embolism (PE) is a serious condition with mortality estimates of up to 7.9%. No study has examined the management of PE and accessibility to the main imaging modalities for diagnosing PE, namely VQ scan and CT pulmonary angiogram, in Canadian rural emergency departments (EDs). We sought to investigate the diagnosis of PE, how long it took to access imaging and the diagnostic utility of each imaging modality in a rural ED. **Methods:** A retrospective chart-review was completed to determine the investigations performed and treatments initiated in the management of suspected PE in a small 20 bed rural hospital. **Results:** Forty-seven cases were reviewed from a 5-year period. Of these, 82.98% had a D-dimer ordered, 25.53% had a leg ultrasound ordered, 31.91% and 40.43% had either a VQ or CT scan ordered during the initial ER visit, and 14.89% received both a VQ and CT at some point during the workup. Thirteen patients (27.6%) were positive for pulmonary embolus with 12 of the positive tests diagnosed by CT scan. The mean time to receive either a VQ or CT scan was 1.58 and 1.59 days, respectively. Low molecular weight heparin was initiated in 82.98% of cases. **Conclusion:** These results conclude that in one rural ED, patients with suspected PE were subjected to equally short delays in receiving either a VQ or CT scan and that CT scan is diagnosing more PE than VQ scan. There may be overreliance on D-dimer testing in rural centres, compared with quoted averages, irrespective of Wells score. Leg Dopplers were not used any more frequently than CT or VQ in aiding the diagnosis. Anticoagulation was started in the majority of patients empirically. Future research could seek to replicate these results in similar rural EDs across the country. **Keywords:** pulmonary embolism, rural emergency medicine, diagnostic evaluation

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ARE narcotics harmful in the treatment of acute pulmonary edema? A critically appraised topic

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Introduction: Acute cardiogenic pulmonary edema (ACPE) is a common diagnosis in the emergency department and use of narcotics like morphine is common. With a 3 parts question, we ask: In adults with ACPE, does administration of narcotics increase mortality or intubation? **Methods:** We searched databases MEDLINE, Embase and Cochrane with keywords. We included English articles with human subjects, in-hospital setting about treatment with any opioid in ACPE. All investigation type were included. Our primary outcome was mortality or intubation, but we analyzed any other outcome. We excluded animals subjects an prehospital setting studies. **Results:** We found 974 titles, of which 4 articles were relevant, 3 retrospective studies and 1 randomized controlled trial. The only narcotic studied was morphine. All retrospective studies showed a trend to an increase mortality in patients with ACPE treated with morphine. In the most important retrospective study, the ADHERE study, number needed to harm is 10 for mortality outcome. Many methodology problems were found in each paper, and important selection biais were found. No information about morphine doses were available. The randomized controlled trial didn't analyzed mortality outcome. **Conclusion:** In retrospective studies, narcotic treatment in ACPE seems to be associated with potential harm. **Keywords:** narcotics, pulmonary edema, critically appraised topic

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A NOVEL approach to case presentations in academic emergency medicine

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Introduction: Case presentations in academic emergency medicine (AEM) are popular as they appeal to our taste for stories and offer better retention than formal teaching. Furthermore, it is possible to find interesting elements in any case, either on an expertise level or another CanMEDS competency. Traditionally, case presentations happen a posteriori with a witness revealing symptoms and signs in a stepwise manner, trying to reproduce the clinical encounter and give the participants the impression they were present, formulating the same questions as the clinical team. Such a task is arduous since it happens out of context and patients are not duplicable on slides. Furthermore, interesting cases present every minute in our crowded emergency departments (EDs), a singularity of AEM. In this study, we postulated that a new approach to case presentation sessions using videoconferencing and wireless technology to generate and search clinical questions would be appreciated. **Methods:** Wireless technology in Université Laval (UL) conference rooms allowed participating emergency physicians (EPs) and residents to use computers and hand-held devices to search the UL library and the Web during the session. Videoconferencing linked participants to an actual ED as they assisted live to the history and examination of a real consenting ED patient, for whom clinical questions were formulated and searched. Pre- and postevaluation questionnaires were distributed. **Results:** Questionnaires were answered by 60 participants and showed that the session was appreciated for its use of new technologies, for its lively participation and for its incentive to generate live clinical questions and instant answers. Most participants tried at least one new information resource during the session. **Conclusion:** This new approach to case presentations leads to improved transmission of clinical information and opens the possibility to teach EP how to search informational resources during a clinical shift in the ED. **Keywords:** case presentations, videoconferencing, distance learning

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ACCREDITATION Canada survey results and new standards content for emergency health services

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Introduction: As part of Accreditation Canada's broader set of Emergency Health Services Standards; comprising emergency department, trauma and emergency medical services; all of these standards were developed in response to an expressed need by health services organizations to assess themselves against a national set of standards. The presentation will outline the analysis of results emergency department survey data as well as emergency medical services survey data. The focus of the analysis will be specific to where emergency medical services are linked with emergency department. There are a number of occasions where emergency health services providers interface with the emergency department and vice versa. The presentation will also include a brief overview of new content

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in the emergency department standards related to organ and tissue donation. **Methods:** Emergency department survey data will be retrieved from surveys that occur between January 2009 and April 2010, and emergency medical services survey data will be retrieved from surveys that occur between January and April 2010. Since the Emergency Medical Services Standards have only been rolled for organizations that have a survey in January 2010 or later, only a few months of survey data will be available for emergency medical services. **Results:** The results will outline trends in terms of strengths and areas for improvement in organizations where emergency medical services interfaces with the emergency department. **Conclusion:** The implications of doing an analysis of survey results will improve understanding of the application of the 2009 emergency department standards as well as 2010 Emergency Medical Services Standards in organizations that provide these services, and how these service areas are linked. **Keywords:** emergency medical services, accreditation, performance standards

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PREHOSPITAL analgesia: a novel approach that conforms to Canadian law

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Introduction: In Quebec's prehospital system, narcotics cannot be administered by paramedics to transported patients with regard to the Collège des médecins du Québec (CMQ) interpretation of Canadian law. Since 2006, the Chaudières–Appalaches Health Region disposes of system wide prehospital communications and a base hospital (BH) that allows transmission of voice communication, monitoring and electrocardiographic (ECG) data from ambulances, with 24 hours a day, 7 days a week support from BH nurses and emergency physicians (EPs). **Methods:** By ways of BH and wireless technology we conceived a dispensation system acceptable to the CMQ for EPs to prescribe narcotics to patients transported by ambulance. **Results:** The protocol is initiated when a paramedic caring for a suffering patient X contacts a BH nurse who confirms inclusion/exclusion criteria and relays the communication to an EP. While the protocol is running, patient X is monitored and clinical and voice data are continuously transmitted and recorded. The EP individually prescribes a narcotic (Sublimaze 200 µg s/c) to patient X. The 42 ambulances of the region are equipped with a narcotic locked case whose electronic combination is unique and changes with activation. The combination is computer generated for each patient by the BH and allows for the controlled prescription of a single dose to a given individual (a CMQ imperative). Once the narcotic case has been used, it is exchanged with a new one at the hospital. **Conclusion:** BH and wireless technology allow this important development for Quebec's patients as huge numbers could gain from prehospital analgesia, pain being present in many emergency situations. Such a use of technology has system wide impacts and fosters benefits on morbidity that are potentially much larger than those obtained from ECG transmission and myocardial infarction treatment regionalization. **Keywords:** prehospital analgesia, medical direction, medico-legal considerations