## 2006 SCIENTIFIC ABSTRACTS

# 2006 CAEP/ACMU Scientific Abstracts Presented at ICEM 2006 June 3–7, 2006, Halifax, NS

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# CAEP Oral Presentations for ICEM 2006

## Sunday, June 4th: CAEP Oral Presentations

### INJURY TRACK

**10**

**Randomized control trial of cast versus removable brace in children with low risk ankle fractures.**

Boutis K, Willan AR, Babyn P, Narayanan U, Alman B, Schuh S. Emergency Medicine, The Hospital for Sick Children, Toronto, Ont., *Canada*

**Introduction:** Isolated distal fibular fractures in children are very low-risk for future complications. Standard therapy with casting carries risks, inconveniences, and use of subspecialty health care resources. In children 5–18 years with low risk ankle fractures, to determine if a removable ankle brace is at least as effective as casting with respect to recovery of performance of daily activities as measured by the Activities Scale for Kids (ASK) at 4 weeks post injury. Secondary objectives included determining differences in range of motion, pain scores, return to baseline activities, and patient preferences. **Methods:** A non-inferiority randomized controlled, single assessor blinded, and single centre trial in a tertiary care pediatric ED. Sample size of 111 patients with low risk fractures was based on testing the null hypothesis (H0) that the brace is 5% less effective at the 5% level and having an 80% probability of rejecting H0 if brace and cast are equally effective. H0 was tested by a t-test for a non-zero difference. **Results:** Of 111 randomized patients, 104 were included in the final analysis, 54 brace and 50 cast. Follow up of the primary outcome completed in 99% of patients. The mean ASK at 4 weeks was 91.3% in the brace group compared with 85.3% in the cast group, a mean difference of 6.0%, with the lower bound of a one-sided 95% confidence interval = 1.13%, $p < 0.0001$. There were no differences in follow up of range of motion or pain scores at 4 weeks ($p > 0.05$). However, 80.8% of the children in the brace group returned to normal activities by 4 weeks compared with 59.5% in the cast group ($p = 0.038$). 54.0% of the children who received the cast would have preferred the brace versus 5.7% of children who received the brace would have preferred the cast ($p < 0.0001$). **Conclusions:** The removable ankle brace is no worse than the cast with respect to recovery of physical function and is superior with respect to returning to normal activities and patient preference. **Key words:** children, casting, ankle injury

### PEDIATRIC TRACK

**19**

**The CATCH rule: a clinical decision rule for the use of CT head in children with minor head injury.**

Osmond MH, Klassen TP, Stiell IG, Correll R, Bailey B, Jarvis A, Joubert G, Kimoff L, McConnell D, Nijssen-Jordan C, Pusic M, Reed M, Silver N, Taylor B, for the CATCH Study Group. Division of Emergency Medicine, Department of Pediatrics, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** As part of the Canadian Assessment of Tomography for Childhood Head Injury (CATCH) Study, the objective was to de-

velop a clinical decision rule for the use of CT head in children with minor head injury. **Methods:** We carried out this prospective cohort study in the EDs of ten Canadian pediatric teaching hospitals and included consecutive children (0–16 years) who presented with a Glasgow Coma Scale (GCS) score of 13–15 and documented loss of consciousness, amnesia, disorientation, persistent vomiting or irritability. Physicians completed a 28-item assessment form prior to CT scan and in some cases a 2nd physician performed an interobserver assessment. The main outcomes were need for neurological intervention and brain injury as determined by CT and a 14-day telephone interview. Analyses included the kappa coefficient, appropriate univariate tests, and chi-square recursive partitioning. **Results:** The 3781 patients had the following characteristics: mean age 9.2; male 64.6%; GCS scores of 13 (2.5%), 14 (7.2%), 15 (90.3%); mechanisms: fall 44.5%, sports 22.5%, bicycle 8.5%, MVC 7.0%; admitted 12.9%; 4.5% had brain injury on CT; and 0.7% required neurological intervention. We derived a CT head rule consisting of four high-risk factors (failure to reach GCS of 15 within 2 h, suspected open skull fracture, worsening headache, and irritability on examination) and three additional medium-risk factors (large boggy scalp hematoma, any sign of basal skull fracture, and dangerous mechanism of injury). The high-risk factors were 100% sensitive (95% CI 86–100%) for predicting need for neurological intervention, and would require only 29.6% of patients to undergo CT. The medium risk factors were 98.3% sensitive (95% CI 95–99%) and 50.1% specific for predicting brain injury on CT, and would require only 49.9% of patients to undergo CT. **Conclusions:** We have developed the CATCH Rule, a highly sensitive decision rule that has the potential to significantly standardize and improve the use of CT in children with minor head injury. **Key words:** children, head injury, computerized tomography

## RESUSCITATION TRACK

**25**

**Impact of a sepsis protocol for the management of patients with severe sepsis and septic shock in the emergency department.**

Stenstrom R, Hollohan K, Nebre R, MacRedmond R, Grafstein E, Dodek P, Innes G, Hunte G, Harris D, Westman J, Christenson J. Department of Emergency Medicine, St. Paul's Hospital, Vancouver; Faculty of Medicine, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** Early treatment of severe sepsis and septic shock with an emergency department (ED) protocol can decrease morbidity and mortality. In July 2005, our ED adopted a protocol based on early goal directed therapy (EGDT; Rivers et al). Our objective was to compare outcomes in patients with severe sepsis/septic shock before and after the adoption of this protocol. **Methods:** In an urban, tertiary care ED (65,000 visits/year) we adopted an EGDT protocol on July 1, 2005 for patients with severe sepsis (sepsis and 1 or more organ failure) or septic shock (SBP < 90 mm Hg after 20mL/kg fluid bolus). Protocol goals were: antibiotic administration within 60 minutes of patient identification, normal saline (NS) boluses to central venous pressure > 8 mm Hg, NS and/or norepinephrine to mean arterial pressure > 65 mm Hg, dobutamine and/or red blood cell transfusion for central venous oxygen saturation > 70%. 30 patients were enrolled in the protocol between July and December 2005 (protocol group). These 30 patients were compared to 20 randomly selected patients with the ED diagnosis of severe sepsis or septic shock (pre-protocol group). All patients were transferred from the ED to the ICU. Outcomes: 28 day mortality, time to: fluid bolus, antibiotic administration and resuscitation goals, and ICU length of stay (LOS). **Results:** The protocol and pre-protocol patients were similar for age, gender distribution, severity scores, baseline lactate level, and comorbidity ($p > 0.10$). 28 day mortality in the pre-protocol patients was 8/20 (40%) versus 5/30 (16.7%) in the protocol group (RR = 0.4; 95% CI = 0.16–1.1). Times to fluid bolus, antibiotic administration, and resuscitation goals were shorter in the protocol group ($p < 0.05$). ICU LOS was significantly shorter in the protocol group ($p = 0.02$). **Conclusions:** Implementation of an ED protocol for severe sepsis and septic shock showed a trend towards decreased 28 day mortality and was associated with decreased ICU LOS and improved time sensitive goals. **Key words:** resuscitation, sepsis, shock

**27**

**Randomized controlled trial of fixed versus escalating energy levels for defibrillation.**

Stiell IG, Walker R, Nesbitt L, Chapman F, Cousineau D, Christenson J, Bradford P, Sookram S, Berringer R, Lank P, Wells GA. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** There is little clear evidence as to the optimal energy levels for initial and subsequent shocks in biphasic waveform defibrillation. This study compared fixed (FIXED) versus escalating (ESC) energy regimens for out-of-hospital cardiac arrest (OOHCA). **Methods:** This randomized controlled trial was conducted in 3 cities with BLS/ALS EMS services and first-responding firefighters. Enrolled were OOHCA patients who required automated external defibrillation (AED) provided by BLS EMS or firefighters. LIFEPAK 500 (Medtronic Inc) biphasic AED devices were randomly programmed to provide, blindly, either FIXED (150–150–150 J) or ESC (200–300–360 J) energy regimens. Outcomes included Conversion (return of QRS complexes within 60 sec), Termination (removal of VF Δ 5 sec), survival, and evidence of harm. We used chi-square and t-test analyses as appropriate. **Results:** We enrolled 221 patients with mean age 66.0 years, male 79.6%, witnessed 63.8%, bystander CPR 23.5%, initial rhythm VF/VT 92.3%. The FIXED ($n = 114$) and ESC ($n = 107$) cases were similar. Comparing FIXED to ESC, for first shocks, rates were similar for Termination (86.8% vs 88.8%, $p = 0.81$) and Conversion (38.4% vs 36.7%; $p = 0.92$). For subsequent shocks, however, rates favored ESC for both Termination (70.8% vs 84.8%; $p = 0.01$) and Conversion (23.6% vs 42.5%; $p < 0.01$). Survival was similar for FIXED and ESC, for return of spontaneous circulation (51.8% vs 48.1%: $p = 0.59$), 1-hour survival (50.5% vs 44.3%; $p = 0.38$), and discharge survival (16.2% vs 16.0%; $p = 0.97$). Harm was somewhat more common in FIXED than ESC groups for ECG ST elevation (64.8% vs 51.2%; $p = 0.18$), cardiac enzyme elevation (74.1% vs 66.7%; $p = 0.40$), left ventricular ejection fraction <35% (24.3% vs 8.1%; $p = 0.06$). **Conclusions:** This is the first randomized trial to compare FIXED and ESC biphasic energy regimens and found more successful termination and conversion for secondary shocks with ESC, no difference in survival between regimens, and a trend towards less harm with ESC. **Key words:** resuscitation, defibrillation, RCT

## TRIAGE TRACK

**30**

**Predictive validity of a computerized emergency triage tool.**

Sandy L Dong, Michael J Bullard, David P Meurer, Sandra Blitz, Arto Ohinmaa, Brian R Holroyd, Brian H Rowe. Department of Emergency Medicine, University of Alberta, Edmonton, Alta., *Canada*

**Introduction:** Emergency department (ED) triage prioritizes patients



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

based on urgency of care. A web-based triage tool (eTRIAGE©) has been developed. This study examined the validity of eTRIAGE© scores based on patient acuity, resource utilization, and cost. **Methods:** Each patient's triage score, resource utilization (measure by need for specialist consultation, computerized tomography, and ED length of stay), acuity (measured by admission to hospital or morgue), and ED and hospital costs were collected over six months. These data were collected from a database that captures all regional ED visits. Correlations between triage score and each outcome were measured with logistic regression models (categorical variables), univariate ANOVA (continuous variable), and the Kruskal Wallace analysis of variance (costs). **Results:** Over the six month period, 29,524 patients were triaged using eTRIAGE©. Compared to CTAS III, the odds ratios for specialist consultation, CT scan, and admission were significantly higher in CTAS I and II, and lower in CTAS IV and V ($p < 0.001$). Compared to CTAS II–V combined, the odds ratio for death in CTAS I was 664.18 ($p < 0.001$). The length of stay also demonstrated significant correlation with CTAS score ($p < 0.001$). Costs also correlated significantly with CTAS scores (median cost for CTAS I = $2,690, CTAS II = $433, CTAS III = $288, CTAS IV = $164, CTAS V = $139, $p < 0.001$). **Conclusions:** eTRIAGE© demonstrates excellent predictive validity for resource utilization, patient acuity, and hospital costs. **Key words:** triage, electronic, CTAS

# Monday, June 5th: CAEP Oral Presentations

## PATIENT SAFETY TRACK

**34**

**Adverse events related to emergency department care.**

Calder LA, Stiell IG, Forster A. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** Previous population-based studies estimated that 3% of all adverse events (AEs) occur in the ED, suggesting it is a low priority area in patient safety. These studies may have underestimated the true rate due to their focus on inpatients. The purpose of this study was to determine the rate and type of AEs related to ED care. **Methods:** This prospective cohort study enrolled consecutive adults from non-ambulatory areas (Canadian Emergency Department Triage and Acuity Scale [CTAS] score I–III) of 2 tertiary care EDs. Critically ill or distressed patients were excluded. Discharged patients were interviewed at 14 days and admitted patients' charts were reviewed. Three emergency physicians, blinded to name of patient and treating physician, assessed all flagged outcomes (such as death, unscheduled ED visits) for AEs. A flagged outcome associated with health care management was an AE. Descriptive statistics with 95% confidence intervals were used. **Results:** Over 4 months, 504 patients were enrolled. Fifty percent were female; the mean age was 57. The most common CTAS scores were III (50.2%) and II (44.4%). Chest pain was the most common presenting complaint (26.3%) followed by abdominal pain (8.9%) and shortness of breath (8.7%). Most patients were discharged home (73.0%). Flagged outcomes were experienced by 20.6% of patients. The reviewers found that 47.4% (95% CI: 40.2%, 54.6%) of flagged outcomes were AEs. Thus, 11.1% (95% CI: 3.3%, 18.9%) of all patients experienced an AE. Preventable AEs accounted for 21.9% (95% CI: 12.4%, 31.5%). Almost half (48.4%) of AEs occurred in patients discharged home. The most common types of AEs were: management issues (13.0%), procedural complications (11.5%), and diagnostic issues (8.3%). Death accounted for 3.1% of AEs, 25.0% were unscheduled admissions and 17.2% were return ED visits. **Conclusions:** This is the largest prospective study conducted in ED patient safety to date. Our data suggest that AEs are more common than previously thought. Future studies will focus on devising strategies for prevention. **Key words:** adverse events; emergency department.

**35**

**Medical error in the emergency department.**

Dankoff J, Afilalo M, Xue X, Leger R, Soucy N, Dankoff S, Colacone A. Emergency Department, Jewish General Hospital, McGill University, Montreal, Que., *Canada*

**Introduction:** The problem of medical error (ME) is well recognized in both Canada and the USA. The emergency department (ED) has been identified as a high-risk setting for ME and for adverse events (AE) because of the nature of the work (high volume, rapid intervention, patient movement, etc.) and the clientele (seriously sick, anxious, in crisis, etc.). This study aimed to assess the impact of patient (e.g. age), clinical (e.g. physician experience), and environment (e.g. occupancy) factors on AE in the ED. **Methods:** A retrospective case–control study was conducted at the SMBD–Jewish General Hospital in Montreal. Cases were patients who had suffered a ME which resulted in an AE. There were 2 control groups: GR1, ME without consequence and GR2, no ME. Cases and GR1 were collected from a database of Morbidity/Mortality/Medical Error rounds (1995 to 2005). GR2 were randomly selected from ED patient visits without ME of the same period. Multiple logistic regression analyses were used for comparisons. **Results:** Sample size consisted of 1276 patients visits: 341 cases, 505 GR1 and 430 GR2. When comparing cases to GR1, patients who suffered an AE tended to be older (OR 1.16, 95% CI 1.07–1.25), used the resuscitation room (OR 2.13, 95% CI 1.48–3.06), or presented with abdominal pain (OR 1.81, 95% CI 1.16–2.83). Patients with minor trauma (OR 0.55, 95% CI 0.32–0.94) or fracture (OR 0.31, 95% CI 0.1–0.98) had decreased risk of an AE. Gender, ambulance, weekday, shift, physician experience, training level, ED occupancy and length of stay were not related to AE. When comparing cases to GR2, patients with AE were older (OR 1.16, 95% CI 1.07–1.26), used the resuscitation room (OR 6.67, 95% CI 3.98–11.2), and were hospitalized (OR 2.35, 95% CI 1.61–3.43). **Conclusions:** Among patients with medical errors, age, use of resuscitation room, certain presenting complaints and diagnosis are associated with adverse events. Comparing cases to visits without medical error, age, use of resuscitation room and hospitalization are associated with the occurrence of adverse events. **Key words:** medical error; emergency department; adverse events.

# Tuesday, June 6th: CAEP Oral Presentations

## AIRWAY TRACK

**40**

**Prospective multicentered study of relapses following emergency department discharge for low risk pneumonia.**

Rowe BH, Blitz S, Campbell S, Clark S, Camargo CA Jr, for the MARC-16 Investigators. Department of Emergency Medicine, University of Alberta, Edmonton, Alta., *Canada*

**Introduction:** Community-acquired pneumonia (CAP) is a common emergency department (ED) presentation and risk criteria exist for admission. Risk factors for relapse after treatment for outpatient CAP are uncertain, and previous research has included limited data from EDs. Our objective was to determine the relapse rate after standardized ED treatment for CAP and factors associated with relapse. **Methods:** A



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

multicenter, prospective cohort study was conducted in Canadian and US EDs. Using a standardized method for enrollment, 22 EDs enrolled patients ages 18+ who were discharged with CAP. Patients with a pneumonia severity index (PSI) of >III were excluded. All patients were treated with clarithromycin for 7 days and followed-up by telephone (2 wks) and in person (4 wks) to ascertain outcomes. Relapse was defined as any urgent visit to a Health Care Provider (HCP) reported at the 2 or 4 week follow-up visit for which a change in antibiotic treatment was initiated. Analysis included multivariate logistic regression. **Results:** Of 637 discharged patients, 53% were male, 71% had a primary HCP, and 36% were current smokers. Relapses occurred at a median of 8 days (IQR: 2–14) in 49 (7.7%) patients. Smoking, PSI class and age were not associated with relapse (all $p > 0.35$). A multivariate model, adjusting for PSI and smoking status, suggested that percussion dullness (OR = 3.1, $p = 0.01$) was associated with relapse. Symptoms of wheezing (OR = 0.3) and bacteria on sputum gram stain (OR = 0.5) reduced risk of relapse (both $p < 0.05$). **Conclusions:** Outpatient treatment of CAP is common, and empirical treatment is recommended with macrolides. When receiving clarithromycin, clinically important relapses are uncommon and patients appear to recover well in this setting. In these low-risk PSI groups, there are limited historical characteristics or physical findings that might assist emergency physicians with identifying patients at risk for post-ED relapse. **Key words:** community acquired pneumonia, antibiotics, randomized controlled trial

## DIAGNOSTIC IMAGING TRACK

**44**

**Controlled clinical trial to implement the Canadian C-Spine Rule.**

Stiell IG, Clement C, Grimshaw J, Brison R, Rowe BH, Schull M, Lee JS, Brehault J, McKnight RD, Dreyer J, Eisenhauer MA, MacPhail I, Rutledge T, Letovsky E, Shah A, Clarke A, Ross S, Perry J, Wells GA, for the CCC Study Group, Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** We previously derived ($n$ = 8,924) and validated ($n$ = 8,283) the Canadian C-Spine Rule (CCR) to guide use of c-spine imaging (CSI) in trauma. The goal of this study was to evaluate the effectiveness of implementing the CCR into practice in multiple EDs. **Methods:** We conducted a matched-pair cluster design trial which compared outcomes during two 12-month 'before' and 'after' periods at 6 'intervention' and 6 'control' EDs, stratified by teaching or community hospital status. Enrolled were all alert, stable adults presenting after acute, blunt head or neck trauma. We randomly allocated sites to either intervention or control groups. During the intervention-site after-period, active strategies were employed to implement the CCR into practice, including education, policy, and 'on-line' reminders. Outcomes included CSI rates and missed injuries. Univariate analyses, appropriate for the data, were used. **Results:** We enrolled 11,104 patients with mean age 37.6 years, female 50.3%, MVC 71.6%, ambulance 59.4%, important c-spine injury 0.9%. Cases were similar, comparing before ($n$ = 5,522) to after ($n$ = 5,582) periods, and control ($n$ = 4,298) to intervention ($n$ = 6,806) sites. However, baseline CSI rates ranged from 33.1% to 73.9%. From the before to after periods, the CSI rate had a relative reduction of 12.4% at the 6 intervention sites from 61.2% to 53.6% ($p < 0.01$) but a relative increase of 10.3% at the 6 control sites from 53.8% to 59.3% ($p = 0.06$); this difference between groups was significant ($p < 0.01$). There were no missed c-spine injuries at the intervention sites. Non-injury patients who did not undergo CSI spent much less time in the ED than those who did (139.3 min vs 248.9 min; $p < 0.001$). **Conclusions:** Despite low baseline CSI ordering rates, active implementation of the CCR led to a significant decrease in use of CSI without missed injuries or patient morbidity. Widespread implementation of the CCR could lead to reduced health care costs and more efficient patient flow in busy EDs. **Key words:** trauma, diagnostic imaging, spine injury

**46**

**A clinical decision rule to safely rule-out subarachnoid hemorrhage in acute headache patients in the emergency department.**

Perry JJ, Stiell IG, Wells GA, Mortensen M, Sivilotti M, Bullard M, Symington C, Lesiuk H, Lee JS, Eisenhauer M, Wiesenfeld L, Caytak J. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** It is unclear which emergency department (ED) patients with acute headache require investigation with computed tomography (CT) and/or lumbar puncture (LP) for subarachnoid hemorrhage (SAH). This study derived a clinical decision rule for the investigation of neurologically intact headache patients. **Methods:** This prospective cohort study was conducted at 6 university tertiary care EDs. Patients >15 years, with normal neurological exam, and a non-traumatic acute (<1 hour to peak) headache were enrolled over 5 years. Excluded were patients with histor of recurrent headaches, referral of confirmed SAH, papilledema, previous SAH or brain neoplasm. Physicians completed study forms prior to investigation. SAH was defined by any of: 1) SAH on CT, 2) xanthochromia in the cerebrospinal fluid (CSF), or 3) red blood cells in the final tube of CSF with positive cerebral angiography. Patients without both CT and LP had 1 month follow-up. Analysis included univariate analysis and multivariate chi-squared recursive partitioning. **Results:** There were 1997 enrolled patients with mean age 43.4 years, female 60.5%, median peak pain intensity 9/10 (IQR 8,10), and worst headache of life 78.5%. 80.3% underwent CT, 45.2% underwent LP, 82.8% had either CT and/or LP and 128 (6.4%) cases had a final diagnosis of SAH. Table 1 shows percent of cases with SAH or no-SAH, and univariate p-values.

**Table 1, Abstract 46**

| Assessment | % SAH | % No-SAH | $p$ value |
|---|---|---|---|
| Arrived by ambulance | 57.0 | 6.7 | <0.001 |
| Vomited | 57.9 | 26.4 | <0.001 |
| Diastolic BP ≥100 mm Hg | 62.5 | 32.4 | <0.001 |
| Age ≥45 years | 78.9 | 39.7 | <0.001 |

This rule requires investigation for patients with one or more of the 4 variables. This rule had 100% (95% CI: 97–100%) sensitivity, 36% (95% CI: 34–39%) specificity for SAH and an absolute reduction in investigation of 17%. **Conclusion:** We derived a highly sensitive, clinical decision rule for the investigation of acute headache. Future studies will validate this rule in a new patient population. **Key words:** headache, decision rule, subarachnoid hemorrhage

**49**

**Computerized tomographic pulmonary angiography compared with ventilation perfusion lung scanning as initial diagnostic modality for patients with suspected pulmonary embolism: a randomized controlled trial.**

Dreyer J, Lang E, Kovacs G, Stiell I, Wells P, Kovacs M, Kahn S, Rodger M, Morrs T, Anderson D. Division of Emergency Medicine, The University of Western Ontario, London, Ont., *Canada*

**Introduction:** Ventilation–perfusion lung scanning (VQ) and com-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

puterized tomographic pulmonary angiography (CTPA) are competing strategies for initial imaging in suspected pulmonary embolism (PE). While considered accurate, these tests have never been compared in a randomized controlled trial examining patient outcomes. The objective of this study was to compare rates of symptomatic venous thromboembolism (SVTE) at 3 months using either a VQ or CTPA led approach. **Methods:** A prospective, randomized double blind trial (clinicians, outcome adjudicators) with concealed allocation was employed. Eligible patients (89% from an emergency setting) were suspected of PE and were "high-risk" by either a "likely" pre-test probability (Wells) or a positive d-Dimer. Patients were randomized to either V/Q followed by bilateral compression ultrasonography (CUS) in the event of indeterminate (non-high, non-normal) results or CTPA followed by CUS for all negative studies. The primary outcome was the development of SVTE at 3 months in patients in whom the diagnosis of PE had been excluded; all-cause mortality was also measured. This equivalence trial was powered to detect a 2.5% minimal clinically important difference in SVTE rates. **Results:** 1405 patients were randomized; 694 to CTPA and 711 to VQ scanning. 19.2% (133) of patients in the CTPA vs. 14.2% (101) were diagnosed with VTE in the initial evaluation period (difference 5.0%, 95% CI 1.1% to 8.9%). Of these, 0.4% (2/561) in the CTPA group vs. 1.0% (6/610) of patients undergoing VQ developed SVTE during follow-up (difference –0.6%, 95% CI –1.6% to 0.3%) including one with fatal PE in the VQ group. All cause mortality was higher at the 3-month follow-up for patients undergoing VQ scanning; 5.1% (36/711) vs. 3.2% (22/694) for CTPA; difference 1.9%, 95% CI –0.2% to 4.0%. Most of these deaths were from cancer. **Conclusions:** CTPA and VQ based diagnostic strategies are equally safe for the investigation of suspected PE in terms of 3-month SVTE rates. **Key words:** pulmonary embolism, ventilation–perfusion scanning, computerized tomography

## EMS TRACK

**54**

**Lower mortality in patients with ST-elevation myocardial infarction triaged in the field and refered for primary percutaneous angioplasty by advanced care paramedics.**

LeMay M, Dionne R, Davies RF, Maloney J, Trickett J, So D, Ha A, Sherrard H, Glover C, Marquis J-F, O'Brien ER, Stiell IG, Labinaz M, Poirier P. Ottawa Heart Institute / University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** Speed of reperfusion is critical in ST-segment elevation myocardial nfarction (STEMI). We sought to determine the feasability and safety of an integrated regional approach in which advanced care paramedics (ACPs) read the pre-hospital electrocardiogram (ECG) and independently triaged STEMI patients to a designated centre for primary percutaneous coronary intervention (PCI). **Method:** We developped a protocol in which ACPs interpret pre-hospital ECGs and bring patients with suspected STEMI directly to a designated primary PCI centre, bypassing the city's emergency rooms. We compared the outcomes of these patients with a retrospective cohort consisting of 225 consecutive STEMI patients brought in by ambulance between July 2001 and January 2004 to the city's emergency rooms. **Results:** Between July 2004 and June 2005, trained ACPs triaged patients with chest pain, and referred 108 consecutive patients with STEMI directly to a designated PCI centre. Primary PCI was perfromed in 93.5% vs 8.9% in the control group, $p < 0.0001$. The median door-to-balloon time was 63 minutes vs 125 minutes respectively, $p < 0,0001$. Thrombolytic therapy was prescribed to 80.4% in the control group. The median door-to-needle time was 41 minutes. In-hospital mortality was lower in the ACP-refered primary PCI group, 1.9%, compared to the control group, 8.9%, $p = 0.017$. **Conclusions:** An integrated regional approach in which ACPs reading the pre-hospital ECG independantly triage and transport STEMI patients directly to a designated centre for primary PCI is feasable, and appears safe. This strategy was associated with very rapid and effective reperfusion, and lower in-hospital mortality compared to the usual strategy where patients are brought by ambulance to the nearest hospital emergency department. **Key words:** myocardial infarction, emergency medical services, angioplasty

## Wednesday, June 7th: CAEP Oral Presentations

## ADMINISTRATION TRACK

**65**

**Variation of consultation practice in urban emergency physicians.**

Curry DG, Wang DM. Department of Emergency Medicine, Calgary Health Region, Calgary, Alta., *Canada*

**Introduction:** Emergency department patient flow is affected by multiple factors, including time waiting for a consultant's assessment. Limited published data exist describing consultation practices of emergency physicians (EPs). This study assessed EP consultation practice variability and relation to patient acuity, training path and years of practice. **Methods:** We assessed the consultation practice of 91 EPs practicing over a 1 year period in three urban adult EDs with admission rates from 15% to 24%. Consult Rate (CR) (% of patients seen by an individual EP for whom consultations were requested) and Consult with Admit Rate (CwAR) (% of consulted patients subsequently admitted) were calculated, based on a computerized database collected during each patient visit. The Student's T test was used to analyze differences between groups. **Results:** Consultation practices for the same EPs varied significantly when working at the highest versus lowest acuity sites (see Table 1).

**Table 1, Abstract 65. Consultation practice: highest acuity vs. lowest acuity sites**

| | Highest acuity | Lowest acuity | *p* value |
|---|---|---|---|
| CR (%; SD) | 28.10 (6.62) | 21.35 (7.29) | 0.000 |
| CwAR (%; SD) | 67.92 (6.17) | 63.98 (11.12) | 0.007 |

There was no statistical difference between EPs with different training paths after 5 years of practice or between FRCP trained EPs regardless of length of practice.($p > 0.05$). When stratified by training path, CCFP-EM trained EPs who had practiced more than 5 years had a lower CR and significantly higher CwAR than CCFP-EM trained EPs in their first 5 years of practice (see Table 2).

**Table 2, Abstract 65. Consultation practice of CCFP-EM: years in practice**

| | >5 yrs ($n = 32$) | <5 yrs ($n = 23$) | *p* value |
|---|---|---|---|
| CR (%; SD) | 22.39 (5.50) | 25.03 (5.45) | 0.08 |
| CwAR (%; SD) | 67.54 (5.28) | 64.63 (4.10) | <0.05 |



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

**Conclusions:** Consultation practices of EPs are variable and related to patient acuity and years of practice, but not to their training path. Further study is required to determine if less efficient consultation practices can be modified with feedback to improve patient flow. **Key words:** emergency department, administration, consultation

**68**

**Multicenter implementation of an emergency department asthma treatment protocol.**

Innes G; Holmes A; Schmidt B; Reeves L; Mendel D; Grympa M; Cunningham W; Mackenzie J; Finkler J. Dept of Emergency Medicine, St. Paul's Hospital, Vancouver, BC, *Canada*

**Introduction:** Many clinical protocols have been developed, but relatively few have been successfully implemented. Protocol implementation remains a challenging task. Our goal was to develop a protocol implementation strategy that EDs can use to introduce new care protocols, and to test this strategy by implementing a patient care protocol in several diverse EDs. **Methods:** Based on the consensus of front-line staff, the provincial ED Protocol Working Group selected acute asthma as the target syndrome for the first provincial ED protocol. We developed an implementation toolkit containing a project overview, a description of roles and responsibilities, a suggested implementation process, asthma algorithms and order sets, educational material and patient discharge tools. Six diverse emergency departments, ranging from 4000 to 52000 visits per annum, were selected as pilot sites. Measured outcomes included staff satisfaction, ease of implementation, perceived impact on patient care, and four clinical process measures: time to bronchodilator, steroid given, peak flow measurement obtained, and asthma education follow-up referral made. **Results:** All six pilot sites successfully implemented the protocol over an 8-week period and 74 ED staff completed the protocol evaluation. The sites studied 135 patient visits before implementation and 180 visits during the 8-week post-implementation phase. ED staff reported that the protocol was easy to implement, that it increased ED efficiency, and that it facilitated better patient care. After implementation, mean time to bronchodilator fell from 53 minutes to 18 minutes ($p < 0.01$), the proportion of patients receiving steroids rose from 52% to 73% ($p < 0.01$), the use of peak flow measurement increased from 61% to 94% ($p < 0.01$), and the proportion of patients referred to an asthma clinic or educator rose from 2% to 52% ($p < 0.01$). **Conclusions:** This systematic approach to ED protocol implementation was successful in diverse EDs and will guide future provincial protocol implementation efforts. **Key words:** asthma, protocol, emergency

**69**

**Does caring for low-complexity emergency departments patients delay the time to first physician contact for sicker patients? Results from the CROWDED study.**

Schull MJ, Kiss A, Katic M. Institute for Clinical Evaluative Sciences, Toronto, Ont., *Canada*.

**Introduction:** Caring for low-complexity emergency department (ED) patients may delay care for other patients. We sought to determine whether the number of low-complexity patients presenting to an ED is associated with delayed time to first physician contact for higher complexity patients. **Methods:** We obtained administrative records on all ED visits to all Ontario hospitals from April 2002–March 2003, excluding very low volume EDs. Variables for each ED were computed for consecutive 8hr intervals. The primary outcome was the mean time from triage to first physician contact (TTMD) for medium and high complexity patients, per 8hr interval. The main predictor was the number of low complexity ED patients (defined as ambulatory arrival, and triage level IV or V, and discharged) presenting in each interval. Covariates were the number of new high complexity (defined as admitted) and medium complexity (defined as neither high or low) patients, mean patient age, sex distribution, hospital teaching status, time of day and day of week, and total patient-hours, all per 8-hr interval. Auto-regressive modeling was used given correlation in the data. **Results:** 1095 consecutive 8-hr intervals at 110 EDs were analyzed. 4.7 million patient visits occurred, 49% of patients were male and mean age was 38.4 years. Low, medium and high complexity patients represented 55%, 34% and 11% of all patients. Median TTMD was 31.8, 43.2 and 36.0 minutes for high, medium and low complexity patients respectively. In adjusted analyses, every 10 low complexity patients arriving per 8 hrs was associated with a 5.4 minute ($p < 0.0001$) increase in mean TTMD for medium and high complexity patients. In contrast, 10 additional high complexity patients per 8hrs were associated with a 73 minute increase ($p < 0.0001$) in TTMD for medium and high complexity patients. Results were similar for lower and higher volume EDs. **Conclusions:** Low complexity ED patients are associated with a negligible delay in the time to first physician contact for other ED patients. **Key words:** low complexity, first physician contact, delay

**70**

**An international survey of priorities of emergency physicians for future development of clinical decision rules.**

Eagles D, Stiell IG, Clement C, Brehaut J, Kelly AM, Mason S, Kellermann A, Perry J. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** The use of clinical decision rules is widely accepted in emergency medicine. This study compared the clinical priorities of emergency physicians (EPs) working in Australasia, Canada, the UK and the US for the development of future decision rules. **Methods:** We administered a prospective email and postal survey to members of 4 national EP associations using a modified Dillman technique. Random samples of members from ACEM (Australasia), CAEP (Canada), BAEM (UK) and ACEP (US) were selected. A pre-notification letter and 4 surveys were sent to optimize response. Analyses included univariate and descriptive statistics with 95% CIs. **Results:** Overall, 1043 (35%) responses were received: Australasia 53%, Canada 57%, UK 12% and US 41%. The respondents were male 74%, mean age 46 years and mean experience 16 years. The clinical problems most often identified by % of physicians and ranking were: % of physicians / rank and Clinical Problem ACEM CAEP BAEM ACEP: Central/serious vertigo: 44/1, 44/1, 27/7, 41/1; Imaging for TIA: 38/3, 40/2, 27/6, 36/4; Febrile child: < 36 mo 41/2, 32/3, 40/2, 27/9; Anterior chest pain: 35/5, 27/6, 39/3, 37/3; CT Angio for PE: 35/4, 22/10, 29/5, 28/8; Bleeding–early pregnancy 29/6, 26/8, 23/10, 31/7; Suicidal risk: 26/8, 30/5, 40/1, 19/13; Weakness in elderly: 18/10, 31/4, 24/9, 33/5; CT for abdominal pain: 27/7, 24/9, 13/18, 32/6; Febrile child < 3 mo: 20/9, 27/7, 17/13, 37/2. **Conclusions:** Among the study countries, there is consistency in identification of clinical problems but considerable variation in prioritization. The top priorities overall were identification of central/serious vertigo and imaging for TIA. These results should help researchers target relevant areas for future development of clinical decision rules in emergency medicine. **Key words:** clinical decision rules, international, survey

# INFORMATICS TRACK

**71**

**Data collection on patients in emergency departments in Canada.**

Rowe BH, Bond K, Ospina MB, Blitz S, Schull M, Sinclair D,



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

Bullard M. Department of Emergency Medicine and University of Alberta Evidence-Based Practice Center, University of Alberta, Edmonton, Alta., *Canada*

**Introduction:** The lack of uniform reporting of data from hospital emergency departments (ED) impairs the ability of institutions and governments to quantify overcrowding. Relatively little is known about the ability of EDs, and regional, provincial and federal governments to quantify ED activity in Canada. The main objectives of this study were to determine the use of electronic data capture in Canadian EDs and the accessibility of provincial data on ED visits, and to identify the data elements and methods of EDIS data collection at the national level. **Methods:** Two cross-sectional studies were conducted: a survey of 243 Canadian ED directors and all provincial and territorial representatives with knowledge about ED data. Descriptive data are presented with counts and proportions. **Results:** Of the 243 ED directors contacted, 158 completed the survey (65% response rate). Overall, only 39% of all ED Directors reported using an electronic ED information system (EDIS). Though triage is performed in nearly all responding EDs, electronic triage is available in only 19% of these. All 13 provincial, territorial and federal government representatives completed the survey (100%). While nine provinces and territories (69%) collect ED data, the source of this information varies. Five provinces and territories (38%) collect triage data, yet only Alberta, the Yukon and Ontario (23%) have a comprehensive, jurisdiction-wide, population-based ED database. Only Ontario and the Yukon contribute this comprehensive data to a national database. **Conclusions:** A large number of institutions do not track patients within their EDs using electronic methods. Variations exist among provinces regarding the type and source(s)of ED data collected. Serious limitations exist with respect to accurate documentation of the degree of ED activity, and, therefore, ED overcrowding in Canada. There is an urgent need for regions to collaborate on a strategy to collect ED data and monitor the magnitude and trends in ED overcrowding in Canada. **Key words:** overcrowding, emergency department, electronic ED information system

## CARDIOVASCULAR TRACK

**78**

**Emergency department patient compliance with outpatient exercise stress test: a randomized controlled trial.**

Richards D, Meshkat N, Chu J, Eva K, Worster A. Division of Emergency Medicine, McMaster University, Hamilton, Ont., *Canada*

**Introduction:** Patients are commonly assessed in the emergency department for symptoms suggestive of acute coronary syndrome and subsequently discharged if found to be at low risk. Exercise stress testing after discharge is the recommended investigation for these patients. We sought to determine if compliance rates with exercise stress tests were higher in patients for whom the investigation was ordered at the time of discharge compared to those patients who were advised to arrange for the test through their family physician (the standard practice). **Methods:** In this randomized controlled trial, the intervention group had a requisition faxed to the exercise stress test lab which contacted the patient, while the control group was advised to contact their family physician to arrange for the test. The primary outcome was a completed exercise stress test at 30 days confirmed through contact with the patient and test facility or the patient and the FP office. **Results:** Of the 238 patients, 231 (97.1%) were included in the intention-to-treat analyses. By 30 days, 87/120 (72.5%) patients in the intervention group and 62/111 (55.9%) patients in the control group had an exercise stress test resulting in an OR of 2.08 (1.21, 3.98). **Conclusions:** When emergency department staff orders a follow-up exercise stress test for patients upon discharge following investigation for potential acute coronary syndrome, the odds that patients will complete the test in 30 days are twice that when patients are advised to follow-up with their family physician for the investigation. Therefore, this strategy may help identify those with coronary heart disease earlier then the usual practice. **Key words:** exercise stress test, randomised controlled trial, outpatient

## EDUCATION TRACK

**91**

**Evaluating "ED STAT!": a novel and effective faculty development program to improve emergency department teaching.**

Sherbino J, Frank J, Lee C, Bandiera G. Division of Emergency Medicine, University of Toronto, Toronto, Ont., *Canada*

**Introduction:** Effective clinical teaching in the emergency department presents unique challenges. There are no validated approaches to enhancing the teaching of emergency medicine (EM) faculty. We evaluated the effectiveness of a novel, evidence-based, skills-oriented program tailored to EM teachers called ED STAT! **Methods:** We conducted a before–after single group evaluation with informed, written consent. We assessed participants' knowledge change as well as teaching behavior change using a multiple choice question (MCQ) and short answer question (SAQ) exam and a teaching behaviors questionnaire. Participants were surveyed for satisfaction in important domains. Data was gathered before, immediately after, and 1 month post course. **Results:** 28 of 31 individuals participated in the pre and post evaluation. 22 participated in the 1 month post evaluation. Overall, 96.3% of participants would recommend ED STAT! to a colleague. Knowledge increase was sustained from pre to 1 month post course: MCQ scores increased by 15.1% (Wilcoxon signed ranks test = 3.85; $p < 0.001$) with a large effect size (d = 1.53). SAQ scores increased by 17.2% (Wilcoxon signed ranks test = 3.22; $p = 0.001$) with a large effect size (d = 0.90). At 1 month post ED STAT!, 55% of participants had increased their amount of teaching, 86% perceived this teaching to be of a greater quality, and 82% had shared new teaching strategies with colleagues. **Conclusions:** EDSTAT! improves participants' knowledge about ED-specific teaching strategies and this improvement is maintained at 1 month. Participants reported high satisfaction and a positive increase in teaching behavior. **Key words:** faculty development, teaching, emergency medicine

## THERAPEUTICS TRACK

**99**

**pH measurement via a non traditional site of capillary blood gas sampling agrees with arterial blood gas pH measurement in a normal population.**

Hall CA, Huffman J, Jordan D, Handley G, Fick GH. Department of Emergency Medicine, Calgary Health Region/University of Calgary, Calgary, Alta., *Canada*

**Introduction:** Evaluation of acid-base disturbance in agitated patients has been limited by lack of a functional sampling method. Traditional sampling is difficult in agitated patients because of the

technique (ear lobe sampling, venipuncture) or because of the effect of restraints (cap gases). This study determines whether serum pH measurement of non-arterialized capillary blood samples from the scapular region (scapgas) achieves clinically acceptable agreement with radial arterial blood gas (ABG) measurement in normal, healthy volunteers. **Methods:** This prospective study evaluated pH measurement in matched pairs of ABG and scapgas samples. 50 subjects were enrolled. 9 sample pairs were not evaluated: 2 because of unsuccessful ABG attempt and 7 because of co-oximeter run time errors. Serum pH in the remaining 41 pairs was evaluated: Pearson's product moment correlation coefficient, mean difference, standard deviation and 95% confidence intervals for the pH difference were calculated. Bland Altman plots were constructed and evaluated for pH agreement. A pH difference between samples of < 0.05 was considered clinically acceptable. **Results:** Pearson's product-moment correlation coefficient between arterial and capillary values for pH was 0.54. Bland Altman plots indicated agreement between the samples. The mean difference between ABG and scapgas pH was –0.006 (SD 0.025); 95% CI for the difference (–0.014, 0.002). **Conclusions:** Serum pH measurement comparison in ABG and scapgas samples demonstrated fair correlation and had clinically acceptable agreement. While further study is required to determine whether the results are similar in patients with altered blood pH, there is potential for scapgas measurement to evaluate serum pH in agitated patients. **Key words:** capillary blood gas, scapula, correlation

**100**

**Dexamethasone in migraine relapses: a randomized, placebo-controlled clinical trial.**

Rowe BH, Blitz S, Colman I, Edmonds M. Department of Emergency Medicine, University of Alberta, Edmonton, Alta., *Canada*

**Introduction:** Migraine is a common presentation in the emergency department (ED). Inflammation is thought to play a role in migraines and there is conflicting evidence regarding the effect of corticosteroids on reducing early recurrences. We designed a randomized clinical trial to test this hypothesis. **Methods:** Consenting adults (older than 17) presenting with acute migraine at 4 Alberta EDs were enrolled. In addition to standard intravenous (IV) abortive therapy, patients were randomized to receive similar appearing IV dexamethasone (DEX; 15 mg) or placebo (PLA) using concealed allocation and in a double-blind fashion. Follow-up telephone interviews were conducted 48–72 hours and 7 days after ED discharge. Relapse was defined as a return to the ED, an urgent clinic visit or a headache that precluded normal activity at the 48–72 hour follow-up. An interim analysis was conducted after 60 patients had completed follow-up. Intention to treat was used for this final analysis. **Results:** 130 patients were randomized; 126 patients are included in the analysis (1 patient left prior to treatment and 3 enrolled twice). Mean age was 35 ± 10.5 years, 81% were female; most (77%) suffered from headaches at least monthly. Overall, 64 received DEX and 62 received PLA. On a scale of 0 (no pain) –10 (worst pain), median pain score at presentation was 8, and 2 at discharge. At 48–72 hours, relapses occurred in 14/64 (22%) and 20/62 (32%) in the DEX and PLA groups, respectively ($p = 0.19$; OR = 0.6; 95% CI: 0.3–1.3). By day 7, 18/64 (28%) in the DEX group had relapsed, compared to 25/62 (40%) in the PLA group ($p = 0.15$). Controlling for treatment assignment, relapse was more common when headache pain was > 2 at discharge (OR: 2.24; 95% CI: 1.1, 5.4). **Conclusions:** The overall relapse rate differed from those previously reported; however, DEX failed to reduce headache relapses after ED discharge. Further research is needed to determine the factors associated with migraine relapse. **Key words:** dexamethasone, clinical trial, migraine

# CAEP Poster Presentations for ICEM 2006

## Sunday, June 4th: CAEP Poster Presentations

## INFORMATICS TRACK

**111**

**Using personal digital assistant-based electronic forms to facilitate research data collection at the point-of-care.**

Balen RM, Zed PJ, Loewen PS, Jewesson PJ. Pharmacy Department, Royal Columbian Hospital, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** Data collection in research typically involves paper forms with manual entry into database software. Personal Digital Assistant (PDA) database development software can electronically replicate paper forms. Our objective was to develop an electronic data collection form (DCF) to facilitate practice-based research data collection with a PDA at the point-of-care. **Methods:** Internet and medical databases were searched to identify available database development software for Operating System (OS). Features of the identified software were ®the Palm evaluated according to OS compatibility, cost, development platform, field capacity, local area network (LAN) synchronization capability, data-sharing was ®functionality, back-end data management, and security. Pendragon Forms chosen for its cost, non-technical development interface, and integration with . Data collected on the PDA is transferred to a database ®Microsoft Access program on a Personal Computer (PC) via a cable connection and execution of the PDA synchronization function. Multiple PDA users can also transmit and share data via LAN. The data can then be analyzed with PC-based software. Data on the PDA is secured with password access control and encryption. **Results:** We developed electronic DCFs to facilitate data collection for several research initiatives. Data entry consists largely of drop down menus of structured responses. PDA-based data collection enabled us to characterize drug-related problems that pharmacists identify during routine care and to evaluate the workload of our Intravenous Resource Nurse Service. We also utilized this technology to study patients experiencing drug related hospitalizations at our institution and we have a protocol in place to investigate drug-related visits to our ED. **Conclusion:** PDA-based DCFs can replace paper forms for practice-based research. Electronic data collection increases efficiency by rendering data in analyzable format and eliminates transcription from paper forms to analysis software. **Key words:** medical informatics, emergency department, pharmaceuticals

**112**

**Toward a tailored web-based information system for minor head injuries.**

Abidi, Samina R, Elvidge, Krista L, Fitzpatrick, Eleanor A. Department of Interdisciplinary Studies, Health Informatics, Dalhousie University, Halifax, NS, *Canada*

**Introduction:** Last year the IWK Emergency Department (ED) had approximately 820 visits for head injuries (3% of total visits). The majority of these are classified as minor head injuries. Upon discharge from the ED, parents are provided with verbal instructions and a head injury handout. Unfortunately, at the time of discharge parents may not fully comprehend verbal instructions and the head



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

injury pamphlet is not tailored to the individual patient. Therefore these discharge instructions may not meet the informational needs of every patient or his/her caregiver. These gaps in information may contribute to unnecessary return visits to the ED and/or increased parental anxiety. The use of web-based health care information portals and the widespread availability of information personalization methods provide an opportunity to offer readily accessible and tailored discharge educational interventions. Studies have shown that tailored informational materials are more likely to be read and retained, perceived as relevant, and more likely to gain the attention of the person for whom they are tailored. A paradigm shift towards self-care and disease management warrants the ubiquitous availability of validated educational content. **Methods:** We propose a web-based interactive learning system to assist with information gaps in the current provision of discharge instructions for minor head injuries. Our methodology is based upon two theoretical models: The Consumer Information Processing Model and Haddon's Matrix. These models will guide the design and development of our web-based interactive learning system. After completion of the system, we will conduct an evaluation study of parents to measure the user-friendliness and usefulness of this system. Study participants will be recruited from the IWK ED. **Results:** pending. **Conclusions:** pending. **Key words:** informatics

**114**

**The demographic bias of email as a survey method in a pediatric emergency population.**

Taylor, BW. Departments of Pediatrics and Emergency Medicine, Faculty of Medicine, Dalhousie University, Halifax, NS, *Canada*

**Introduction:** Ensuring feedback from parents to physicians in a pediatric emergency department is problematic. Consequently, evaluating many aspects of patient care is made more difficult. Email has been considered as a communication medium between patients and clinicians in other contexts. We developed a paper based survey to explore access, willingness to participate and the demographic bias of email within our parent population. **Methods:** To 1733 possible subjects, 1200 surveys were distributed with a return of 1018, a survey response rate of 85%, and a population response rate of 59%. **Results:** Subjects from families with incomes less than $60,000 per year had lower access rates (OR = 0.40, 95% CI [0.25,0.62]), as did those with lower education (OR = 0.37, [0.17, 0.81]). Employment outside of the home was associated with increased email access rates (OR = 1.79, 95% CI [1.19, 2.70]). Visible minority status was associated with an increased willingness to participate (OR = 1.84, 95% CI [1.10, 3.06]) as was low education (OR = 2.12, 95% CI [1.04, 4.32]). **Conclusions:** We have demonstrated a degree of demographic bias in email access rates, negatively affecting those individuals with lower income, less employment, and lower education. Because of an opposing bias with regard to willingness to participate in those with visible minority status and lower education, the degree to which this would have affected a hypothetical email based survey in our population was small. Email based surveys directed at parents in pediatric emergency departments should include questions on income, employment and education in order to correct for these variables, otherwise the intrinsic biases of an email survey may render the data obtained less useful. More research is needed to confirm these findings using email surveys, rather than paper based tools. **Key words:** medical informatics, emergency medicine, pediatrics

**115**

**The electronic discharge summary: a novel and efficient way to capture ED discharge information informatics.**

Grafstein E, Innes G, Lonergan K, Jennings C. Department of Emergency Medicine, Providence Health Care, Vancouver, BC, *Canada*

**Introduction:** Capture and transmission of ED discharge information is usually limited to a faxed copy of an illegible ED physician chart. We developed an electronic discharge summary (EDS) that physicians use at the end of the ED visit to record diagnosis, procedures, follow-up and prescriptions. This information is collated with other visit data, forming an electronic ED summary that is automatically faxed to the primary care physician and retained as part of the patient record. Our objective was to compare the capture of ED discharge diagnosis and procedures performed before and after EDS implementation. **Methods:** At an urban academic centre, using the previously validated ED administrative database, we retrospectively reviewed the capture rate for discharge diagnosis and procedures performed between 2001–2005, when a data entry technician (DET) entered these from the ED chart post hoc, to the capture rate after EDS implementation. **Results:** All physicians, fi FTE or greater (27/27), utilized the EDS. During the first 5 months after EDS implementation, discharge diagnosis capture rate was 94.6% (22576/23858) as measured 1 week after the end of the 5 month period and 3080 procedures were documented. Timely capture (within 24 hours of patient visit) rose from 68% after implementation to 80% in month 5. Overall discharge diagnosis capture using a data entry technician was 98% (240,864/245,688), but data accrual was slower with less than 90% capture at the end of any 5 month period but reaching 98% at 9–12 months after the ED visit. Fewer procedures were captured by the DET (mean = 2325 for a comparable time period in other years). All physicians used the electronic prescription writing functionality creating a total of 5028 electronic prescriptions in the 5 month period. **Conclusion:** The electronic discharge summary is a novel and timely way to capture ED discharge information rapidly and efficiently without the aid of a data entry technician. Ongoing process improvements will improve discharge diagnosis capture. **Key words:** medical informatics, emergency department, discharge

**118**

**Knowledge sharing behaviors among rural and urban emergency practitioners using a discussion forum: a social network perspective.**

Curran J, Abidi SSR. Faculty of Graduate Studies, Dalhousie University, Halifax, NS, *Canada*

**Introduction:** Research supports that health care practitioners rely on their network of relationships to find information and solve problems. The existence of social relationships among emergency department (ED) practitioners creates opportunities for sharing expert knowledge. However, the nature of the ED setting and geographic dispersion pose a challenge for sustained and meaningful real-time shared initiatives. Factors that impact success in information sharing include access, habit, time, and relevance. Collaborative technologies such as electronic discussion boards may address some of these issues and increase opportunities for the development of a knowledge-sharing network. Social network analysis (SNA) provides a means for mapping and analyzing relationships among people, teams and/or organizations. In this paper a SNA approach will be used to describe the knowledge sharing patterns among rural and urban ED practitioners participating in an online discussion forum. **Methods:** 1. A discussion forum, facilitated by content experts, was established for practitioners in rural and urban EDs. Discussion topics were generated by content experts and participants. 2. Interaction data from the discussion board was analyzed using UCINET, a Social Network tool. **Results:** The online discussion forum was available to 207 practitioners from 9 rural and 2 urban EDs in Nova Scotia. Forty three percent ($n$ = 89) of participants accessed the discussion board at least once and 69% of those ($n$ = 62) posted at least one message. All eleven EDs were represented in the discussion postings. A vari-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

ety of information seeking and information sharing behaviors were exhibited. Geography, gender and professional affiliation were found to impact network ties and network positions. **Conclusions:** Electronic discussion forums present an opportunity to engage in a range of information seeking and sharing behaviors. Supporting more effective knowledge-sharing practices will positively impact the quality of care delivered in EDs in Nova Scotia. **Key words:** informatics, emergency medicine, knowledge translation

## INJURY TRAUMA TRACK

**120**

**Mayhem on ice: Are team officials being injured as a result of their players being injured?**

Arbeau RP, Gordon KE, McCurdie G. Faculty Of Medicine, Dalhousie University, Halifax, NS, *Canada*

**Introduction:** Team officials of rink sports may be required to cross the ice surface to access the player benches or to attend to an injured player. The following case study/review comments on 2 cases of team officials suffering injuries while crossing the ice, along with injury reports from a Hockey Canada administrative database. Cases: The cases include one report of a head laceration and concussion and another with a cerebral hemorrhage and resulting death. **Methods:** The Hockey Canada insurance database was analyzed to include injuries that resulted from falls on ice during game time from mid 2001 through mid 2005. **Results:** There were reports of 988 injuries of team officials including 94 concussions, 5 internal organ injuries, 226 fractures and 86 separation/dislocations. **Conclusions:** Team officials may be required to walk on the ice during games, but this is not something that they would expect might result in injury, concussion or even death. There are two ways to deal with injuries occurring from falls on ice: preventing the fall and/or preventing the injury. Falls and subsequent injury by team staff can be prevented by rink design and policy. As many injuries appear to occur while attending to injured players, the most prudent preventative strategy would appear to be the wearing of gait-stabilizing devices. Wearing helmets may offer supplemental protection against the rare catastrophic neurosurgical trauma. **Key words:** injury, hockey

**124**

**Minimally angulated pediatric wrist fractures: Is casting without manipulation enough?**

Boutis K, Al-Ansari K, Howard A. The Hospital for Sick Children, Toronto, Ont., *Canada*

**Introduction:** There is practice variation of the management of minimally angulated wrist fractures in children, and 25% of ED physicians would manipulate these fractures to obtain anatomic alignment under anesthesia prior to immobilization. However, due to the unique capacity of children's fractures to heal with remodeling, manipulation may not be necessary. Objectives: In skeletally immature children with bicortical minimally angulated (<15 degrees of angulation on lateral xray, <0.5cm displacement) metaphyseal radius±ulna fractures managed initially only with plaster immobilization, to determine the proportion of fractures that required surgical intervention (i.e., requiring closed or open manipulation and/or fixation of the fracture) in the 6 week follow up period. A secondary objective included documenting changes in angulation over time. **Methods:** A retrospective cohort study that reviewed consecutive records of all children with wrist fractures at a large, tertiary care pediatric hospital. Sample size of 124 was calculated using the proportion and 95% confidence interval estimate equation, assuming 3% of fractures would subsequently require surgical intervention. **Results:** 124 patients were included in the final analysis. Mean age was 8.7 (± 3.2) years. None of these patients required surgical intervention in the follow-up period. All but 8 (6.5%) patients had a final angulation < 20 degrees. Six patients (4.8%) with initial angulation 11– 15 degrees progressed to 20– 25 degrees, and two (1.6%) patients initially at 15 degrees progressed to 30– 35 degrees (radiographic remodeling in the latter cases is pending further follow up). No patients had a clinically apparent physical deformity and all had normal function in follow up, thus the lack of surgical intervention. **Conclusions:** Minimally angulated wrist fractures with the aforementioned criteria are safely and adequately managed in the ED and in follow up by plaster immobilization only, and are at very low risk for requiring future surgical intervention. **Key words:** pediatrics, injury, fracture

**125**

**Concern of compartment syndrome following traumatic hip or femoral shaft fracture not a reason to withhold regional anesthesia in the emergency department.**

Vu EN, Guy P. Division of Emergency Medicine, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** The 3-in-1 femoral nerve block (FNB) is a safe and effective option for perioperative pain management in selected lower limb surgeries. The application of FNB for pain management in the Emergency Department (ED) is well documented. A concern with the use of FNB in patients with traumatic hip and femoral shaft fracture is that the limb anesthesia associated with FNB might mask a compartment syndrome (CS) of the proximal lower extremity. However, there is little data to support this concern since the incidence of CS in this patient population is not well established. The objective of this study is to identify the incidence of CS in patients presenting with traumatic hip or femoral shaft fractures at our tertiary care institution. **Methods:** Institutional research ethics board approval was obtained for this study. A retrospective chart review of the prospectively gathered orthopedic trauma database of the Department of Orthopedics at Vancouver General Hospital was conducted from January 1987 to May 2005. Records for closed femoral neck and femoral shaft fractures were identified. This cohort was further analysed for associated diagnoses and procedures during admission, identifying patients who were subsequently diagnosed with CS or underwent fasciotomy while in hospital. **Results:** A total of 5392 femoral neck or shaft fractures were identified. The number of femoral neck fractures was 2194 (40.7%), intertrochanteric fractures 1849 (34.3%), subtrochanteric fractures 510 (9.5%), and femoral shaft fractures 839 (15.6%). There were no identified cases of CS or fasciotomy. **Conclusions:** The incidence of CS or fasciotomy following traumatic fracture of the hip or femoral shaft was 0% in our series. In light of this, we believe that 3-in-1 FNB can be safely used as a pain management modality for patients with femur fractures in the ED without fear of masking a CS. **Key words:** compartment syndrome, emergency department, anaesthesia

**131**

**The terrible truth of toppling televisions.**

Dotchin SA, Gordon K. Department of Ophthalmology, Dalhousie University, Halifax, NS, *Canada*

**Introduction:** Although data is limited, accidents due to television tipovers have been identified as a significant risk of childhood injury. Compounding this problem is the trend toward increasing television size. A retrospective analysis of television related injuries was undertaken. In addition to this the facility with which a child could tip televisions in a pediatric hospital was examined. **Methods:** A retrospective analysis of the CHIRPP database was conducted to determine the



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

number of television related injuries within the local health region between 1990–2002. In coordination with this, a static model of a child with appropriate proportions and weight was attached to each accessible television console within the hospital to determine whether televisions in the hospital were safe from tipping. **Results:** Between 1990–2002 104 childhood injuries were related to televisions with the majority occurring in the 2–4 age range. Of all reported injuries 61% occurred in males. Of the 104 reported injuries the most common area to be injured was the head and neck. Within the hospital 90% of televisions were tippable by children 4yrs. of age or younger. The median television size was 21 inches with the mean height above ground being 92cm with a standard deviation of 16cm. Only 34% of televisions were anchored to their consoles. **Conclusions:** Television sets are not safely maintained within the hospital, one can only speculate about television safety in the general population. Parents need to be aware of the potential for televisions tipping resulting in serious injury to children. **Key words:** injury, pediatrics, television

**142**

**Effectiveness of bicycle helmet legislation to increase helmet use: a systematic review.**

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**Introduction:** Head injuries related to bicycle use are common and can be serious. They can be prevented or reduced in severity with helmet use; however, education has resulted in modest helmet use in most developed countries. Helmet legislation has been proposed as a method to increase helmet wearing; while this social intervention is thought to be effective, no systematic review has been performed. This review evaluates the scientific evidence for helmet use following legislation to identify the effectiveness of legislative interventions to increase bicycle helmet use among all age groups. **Methods:** Comprehensive searches of the databases, the grey literature, reference lists and communication with authors was performed to identify eligible studies. Eligible studies for this review were community-based investigations including cohort studies, controlled before–after studies, interrupted time series studies, non-equivalent control group studies. Two reviewers extracted the data. Individual and pooled odds ratios (OR) were calculated along with 95% confidence intervals (CI). **Results:** Out of 86 pre-screened articles, 25 were potentially relevant to the topic and 12 were finally included in the review. Of 12 studies, eight articles, two reports, one unpublished manuscript and one Governmental report. While the baseline rate of helmet use among these surveys varied between 4% and 59%, after legislation this range changed to 37% and 91%. While the effectiveness of bicycle helmet legislation varied ($n$ = 12 studies; OR range: 1.2–22), all studies demonstrated higher proportions of helmet use following legislation, particularly when the law was targeted to a specific age group. **Conclusions:** Legislation increased helmet use among cyclists, particularly younger age groups and those with low pre-intervention helmet wearing proportions. These results support legislative interventions in populations without helmet legislation. **Key words:** injury, systematic review, prevention

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**Epidemiology of bicycle injuries in 13 health divisions, Islamic Republic of Iran 2003.**

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**Introduction:** To describe the nature and extent of bicycle injuries sustained and circumstances of patients presenting to emergency departments after bicycle collisions in thirteen health divisions in Iran. **Methods:** This study was performed using available data from a survey that was carried out in 2003. The survey was performed for periods of 3 to 6 months among 64 cities/towns in Iran. Instruments were completed by trained health workers in hospitals through: 1) interviewing patients, relatives and hospital personnel 2) extracting data from hospital records and death records from the coroner's office. The abbreviated injury scale (AIS) and injury severity score (ISS) were used to categorize severity of injury. **Results:** Altogether, 8817 persons were hospitalized and/or died due to traffic-related injuries. Bicycle casualties comprised 440 (5%) of cases; of whom 420 (95.5%) were non-fatally injured and 20 (4.5%) died. The majority of fatally and non-fatally injured cyclists were male: 19 (95%) and 417 (94.8%) respectively. Most (75%) of injured cyclists were ≥18 years old (median 14). The 5–19 age group had the highest incidence of cycling injuries, 67.6 person-years (p-ys). The incidence of injury among males, (84.8 p-ys), was 18 times greater than females (4.6 p-ys). Head injuries occurred in 14% of all cases and 90% of fatal cases. In a multivariate analysis, striking a moving vehicle was found to increase the risk of death by 32 times (OR: 32.3; 95% CI 3.5 to 291.0) and risk of severe injury by nearly 2 times (OR: 1.9; 95% CI 1.2 to 3.2), compared to a fall, striking a stationary object or being hit by a vehicle. **Conclusions:** Bicyclists in Iran are vulnerable to severe injury and death especially through head trauma and when striking a moving vehicle on a highway. Mortality and morbidity resulted from cycling can be prevented by some simple measures such as helmet use and specific routes and also some regulations like helmet law for bicyclists. **Key words:** injury, bicycle, epidemiology

**144**

**Head injuries in the rural setting: What is the role of the Canadian CT Head Guidelines?**

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**Introduction:** The Canadian CT head rule is a valuable tool in the clinical assessment of head injuries. It risk stratifies head injured patients, identifying the ones that will require neurological intervention and the ones having clinically important brain injuries (sensitivities 100% and 98.6%, respectively). This standardized approach to head injuries may challenge the rural practitioner without access to CT scan. The Whistler Health Care Center (WHCC) is a Diagnostic and Treatment Centre that sees approximately 23,000 patients annually, many of them trauma patients with a high acuity level and no CT scanner on site. This provides a unique setting to study head injuries: we see a large number of head-injured patients with limited diagnostic tools, much like many other rural facilities in Canada. **Methods:** Retrospective chart review of all patients triaged with head injury, or trauma, to the WCHH in 2004. Canadian CT head guidelines were applied to all charts, and were risk stratified according to the guidelines. **Results:** 515 charts were reviewed, 305 of which were excluded (5 GCS < 13, 1 pregnant, 5 seizures prior to assessment, 56 no amnesia, LOC or disorientation, 38 follow-ups, 174 age < 16 yrs, 22 not seen by MD, 1 acute neurological deficit, 1 unstable vitals, 1 depressed skull fracture, 1 anticoagulant use), and 210 were included. Of the 210 included charts, 51 had CT indicated, and only 11 of these were transferred to a health care facility with CT scan available. **Conclusions:** In 2004, the WHCC saw a high number of head injuries. Of these, 9.9% would have required a CT scan if the Canadian CT head guidelines were applied. When the CT head guidelines are applied to the rural setting without diagnostic CT, all patients with high risk criteria should all be transferred. A prospective study in a similar setting is recommended to determine the management of moderate risk patients. **Key words:** injury, emergency department, decision rule

**146**

**Air bag associated pneumonitis.**

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**Introduction:** Air bags have been used to reduce the mortality associated with motor vehicle accidents since the mid-1970s. However, these safety devices can also cause injury. Fractures, chemical burns, cardiovascular and ophthalmologic trauma, soft tissue injuries and death have been widely reported. Inhalation injuries related to the release of toxic compounds have rarely been reported. This case report focuses on the pulmonary injury sustained by an 18-year-old male involved in a high-speed motor vehicle rollover with air bag deployment. Pulmonary injury presented as significant bilateral upper-lobe densities on chest radiography and computerized tomography with clinical signs limited to modest compromise of respiratory function. Subsequent clinical and radiological evaluation supported a diagnosis of bilateral upper-lobe pneumonitis related to a toxic inhalation injury. **Methods:** Clinical case report supported by a review of the literature (Medline 1970 to current) for injuries related to air bag deployment. **Results:** The clinical scenario, patient management, results of plain radiography and computerized tomography imaging at presentation in the emergency department and the patient's follow-up pulmonary function testing are reported. Literature review supports the potential role of sodium azide, a highly toxic compound and the main constituent in air bag gas generants, as the toxin causing injury in this case. **Conclusions:** Use of air bags will continue to increase as these safety devices are more widely installed in automobiles. The potential for air bag associated injuries must be considered in any patient presenting to the emergency department following a motor vehicle accident. Inhalational injury, including chemical pneumonitis from sodium azide exposure, should be included in the differential diagnosis of patients presenting with pulmonary densities on chest radiography following deployment of an air bag. **Key words:** injury, pneumonitis, air bags

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**Glasgow Outcome Score as a predictor of the functional independence measure in the OPALS major trauma study.**

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**Introduction:** The Glasgow Outcome Score (GOS) measures functional outcome in major trauma patients but there are few data regarding its validity. We studied the accuracy of the GOS for predicting the more rigorous Functional Independence Measure (FIM). **Methods:** This prospective cohort substudy of the Ontario Prehospital Advanced Life Support (OPALS) Study was conducted in 17 cities and enrolled adult major trauma (ISS>12) patients. Included were survivors with both GOS and FIM assessed on hospital discharge. The GOS is a simple measure of function that ranges from 5 (good recovery) to 1 (death) and can be taken from the hospital chart. FIM evaluates functional outcome from 18 (dependent) to 126 (independent) and requires a detailed interview. Data were also collected from ambulance dispatch, EMS, and the Regional Trauma Registry. Data were compared via chi-square, Spearman's and Kappa statistics, as well as measures of validity (sensitivity and specificity) and clinical yield (positive and negative predictive value). **Results:** Of 733 eligible patients: mean age 44.2 (range 16–94), male 75.3%, blunt injury 98.5%; initial GCS < 9 28.6%; mean ISS 24.2 (SD 9.1); median FIM 102.0 (IQR 73.5–116.0); GOS scores: 1 (dead) 0%, 2 (vegetative) 3.3%, 3 (severe disability) 27.4%, 4 (moderate disability) 15.1%, 5 (good recovery) 54.2%. Median FIM scores were: GOS 2–18.0; GOS 3–57.0; GOS 4–98.0; GOS 5–114.0. High GOS was a good predictor of a higher FIM ($\Delta$100): Spearman's 0.55, $p < 0.001$; Kappa 0.55, $p < 0.001$; Sensitivity 80.0%, Specificity 75.2%, PPV 78.6%, NPV 75.2%. Lower GOS was a good predictor of lower FIM (<100): Spearman's –0.56, $p < 0.001$; Kappa –0.50, $p < 0.001$; Sensitivity 58.3%, Specificity 91.4%; PPV 88.9%, NPV 91.4%. **Conclusions:** This is the first study to compare the use of GOS and FIM scoring systems among major trauma patients. The GOS appears to be a simple and accurate predictor of functional outcome at discharge and may be used as both a clinical and a research tool for major trauma patients. **Key words:** injury, advanced life support, clinical scores

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**Spine injuries in mountain bikers: the Vancouver experience.**

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**Introduction:** Mountain biking (MB) is a popular sport with a high risk of traumatic injury. We reviewed MB related spinal injuries in three trauma centres over a 10 year period. **Methods:** Three Vancouver area trauma centers serve a MB 'Mecca' which caters to 56,000 riders/yr. Trauma and Spine Registries for these hospitals were reviewed from 01/01/1994 till 31/12/2004. Patients qualified for the registries if (1) they presented within 7 days of injury, and (2) were admitted for 3 or more days and/or had an injury severity score (ISS) >12 and/or expired in hospital. We electronically searched these registries to identify MBs with spinal injuries and then reviewed their medical records. **Results:** During the study period 1037 injured cyclists were captured in the Trauma or Spine registries. Of these we identified 399 (38.4%; 95% CI = 35.5%–41.5%) MBs, of whom 52 (13.0%; 95% CI = 9.9%–16.7%) sustained spinal injuries. The MBs with spinal injuries were male (48/52 = 92.3%; 95% C I= 81.4%–97.9%) with an av age of 33 yrs (range 14–51, median 30, stnd dev 11.9). Most (36/52 = 69.2%; 95% CI=54.9%–81.3%) used a helmet, but 5/52 (9.6%; 95% CI = 3.2%–21.0%) did not. Helmet use was not reported on in 11 (21.7%). The most common mechanism was a fall over the handlebars in 29/52 (55.8%; 95% CI = 41.3%–69.5%). Severe spinal injuries were common: 37/52 (71.2%; 95% CI = 56.9%–82.9%) required operative treatment and 28/52 (53.8%; 95% CI = 39.5%–67.8%) had a neurological deficit on discharge. The av LOS was 17 days. Discharge dispositions were: home 32/52 (61.5%; 95% CI = 47.0%–74.7%), rehab 15/52 (28.9%; 95% CI = 17.1%–43.1%), acute care facility 4/52 (7.7%; 95% CI = 2.1%–18.5%) and against advice 1/52 (1.9%; 95% CI = 0.1%–1.0%) **Conclusions:** Mountain biking is a growing cause of serious spinal injuries often resulting in permanent disability. Young males are principally at risk. The universal use of protective equipment and appropriate training should be mandatory. In response to our research, MB injury prevention programs including a public service announcement were initiated. **Key words:** injury, biking, emergency department

**149**

**Impact of a Canadian regional trauma program on patient outcomes: a ten-year retrospective.**

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**Introduction:** Regionalization of trauma centres has been shown to improve patient outcomes. Over the past ten years, the Hamilton Health Sciences General Hospital site has developed and maturated a regional trauma program. The objective of this paper is to deter-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

mine the effect of the trauma program on patient outcomes over the ten-year period. **Methods:** We conducted a retrospective cohort study comparing the first two years of complete data (1995/1996 $n$ = 831) with the most recent two years of complete data (2003/2004 $n$ = 975) using the Hamilton General Hospital trauma database for all admitted adult trauma patients with an ISS greater than 13. Both demographic and outcome variables were analysed. Outcome variables included in-hospital mortality, number of vented patients, and hospital length of stay. Continuous variables were compared using Student's t-test and categorical data using chi-square. **Results:** Initial analysis demonstrates that in-hospital mortality was similar between 1995/96 (15.9% 95% CI 10.5–21.3) and 2003/2004 (15.3% 95% CI 10.0–21.6). However, there were significant differences between the two time periods with respect to patient age, injury severity scores, and hospital length of stay. In 95/96, the mean age was 45.5 (95% CI 44.0–47.0) compared with 50.0 (95% CI 48.7–51.4) in 03/04. Mean ISS scores decreased from 24.4 (95% CI 23.8–25.1) to 22.7 (95% CI 22.1–23.29) respectively. Mean length of stay was significantly shorter in patients discharged alive in 03/04 (18.1 days 95% CI 16.4–19.9) compared to those in 95/96 (23.6 days 95% CI 21.7–25.5). **Conclusions:** Since the introduction of the regional Hamilton trauma program, there has been a trend towards increasing number of patients, increasing age of patients, and decreasing acuity. There has been no interval change in mortality. Further evaluative research is needed to determine patient, program, and regional factors that are implicated in this trend. **Key words:** trauma, patient outcomes, mortality

**150**

**A comparison of survival probabilities according to the transfer status of trauma victims.**

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**Introduction:** Little is known about the injury profiles of patients transferred from a lower to a higher level of care hospital compared to patients that are not transferred. We've compared injury profiles and survival probabilities of transferred and non transferred adult trauma victims in a regionalized system including four levels of care. **Methods:** The Quebec Trauma Registry contains data observations from all 58 designated trauma centres of four levels of care in the province. Between 1998 and 2005, 36,118 adults (i.e. age > 16) trauma patients were transported to these centres. Of these 9,281 (25.7%) were transferred to a higher level of care. Deaths on arrival and those occurring less than two hours after arrival at the initial hospital were excluded as they were considered unfit to transfer. Multiple logistic regression was used to compare the mortality according to transfer status and level of trauma care, while adjusting for cofounding factors. **Results:** Comparison of adjusted mortality of patients transported directly to a trauma centre and not transferred revealed increasing mortality for decreasing expertise, as expected (Odds Ratios (OR) of 1.00, 1.08, 1.23 and 1.41 for levels I to IV, respectively). However, adjusted mortality of patients transferred to a level I centre was lower than that of patients sent directly to a level 1 trauma center: OR = 0.74, 0.84, 0.907, 0.48 if transferred from a non-designated, level IV, level III and level II centre compared to 1.0 for direct transport to level I centre, respectively. Adding a transfer factor to the regression analysis model also revealed a protective effect of being transferred compared to direct transport (OR = 0.86, 95% Confidence Interval = 0.76–0.97). **Conclusions:** Lower mortality for patients transferred to a level I centre over patients arriving directly may indicates the presence of selection bias. Our results suggest that the results of studies evaluating the benefits of transferring trauma patients to higher levels of care could be misleading. **Key words:** trauma, regionalization, mortality

**151**

**Evaluation of etomidate's effect on adrenal gland secretion of cortisol in intubated traumatic brain injury victims (EVAST): a prospective cohort study.**

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**Introduction:** Etomidate is one of the most used induction agents for intubating head trauma patients. Therefore, it is important to evaluate the consequences of any adrenal suppression that could result from the use of this agent. The primary objective of this study is to determine the effect of etomidate on adrenal cortisol production and the length of adrenal suppression (AS) after its use in intubated head trauma patients. **Methods:** This study is a prospective cohort study. The eligible patients were all intubated moderate to severe head trauma patients admitted to a neurosurgical reference centre (Enfant-Jesus Hospital, Quebec City, Canada) between 2003 and 2004. Three ACTH stimulation tests (250 mcg) were performed 24, 48 and 168 hours after intubation. Patients having received etomidate and those not having received it were compared on the basis of their responses to these three ACTH stimulation tests. Adrenal suppression was assessed by comparing cortisol levels at baseline, 30 and 60 minutes after the ACTH stimulation test. Linear and logistic regression models were applied to adjust for confounding variables. **Results:** This study included 40 patients. Fifteen patients received etomidate and 25 received other induction agents. At 24 hours after intubation, the patients having received etomidate presented a blunted response to the ACTH stimulation test. Etomidate decreased the response to ACTH significantly by 145,8 nmol/l (95 CI: 83,4–208,2) ($p$ = 0,02). After adjustment for confounding variables (age and Injury Severity Score) this decrease in response persisted to be significant: 134,3 nmol/l (95 CI: 70,1–198,5) ($p$ = 0,04). At 48 and 168 hours, there was no statistically significant difference in responses to the ACTH tests in both groups. **Conclusions:** Etomidate decreases the response to ACTH stimulation tests up to 24 hours after a single dose used in the Emergency department for intubating traumatic brain injury victims. **Key words:** cortisol, trauma, intubation

## PEDIATRIC TRACK

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**Performing procedures in emergency departments, a national survey of Canadian paediatric emergency.**

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**Introduction:** An important part of Paediatic Emergency Medicine training is becoming comfortable and expert with common procedures performed in the Paediatric Emergency Department. There is little documentation on how frequently this occurs and to what extent trainees become comfortable with these procedures during fellowship. **Methods:** A survey was developed by the authors and pretested among 5 paediatric emergency staff at Children's Hospital of Western Ontario. The survey was then modified and mailed out to all Canadian fellows in Paediatric Emergency Medicine using a modified Dillman technique. Data was analyzed using the Mann–Whitney test for continuous variables, and the chi-squared test or Fisher's exact test for proportions. Analysis included comparison between first and second year fellows. **Results:** 32 questionnaires were returned giving a response rate of 70%. Among the 23 procedures assessed, the ones most commonly mastered were endotracheal intubation, removal of airway foreign bodies, intravenous

access, orthopaedic procedures, and complex laceration repair. Procedures taught but not commonly performed included pericardiocentesis and surgical airway skills. There were significant differences between first and second year fellows in regard to comfort with using adjuvant airway devices ($p = 0.01$). **Conclusions:** At the end of their second year of training it is highly likely that fellows in Paediatric Emergency Medicine will have mastered basic airway skills, vascular access techniques, orthopaedic and simple plastic surgery procedures. Other procedures which are not commonly performed in emergency are demonstrated and evaluated during the fellowship. **Key words:** children, sedation, survey

**157**

**Does this child have acute meningitis? A systematic review.**

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**Introduction:** Early recognition of meningitis is imperative for expedient initiation of appropriate therapy and investigations. Our objective was to systematically review the literature to assess the accuracy of common physical exam signs and symptoms in children with suspected meningitis. **Methods:** A search of the literature was conducted using MEDLINE, EMBASE, CINAHL, Web of Science, Pubmed, the Cochrane Library, Google Scholar, selected review articles, textbooks and primary authors. Prospective and retrospective case–control cohort studies were included if they described signs and symptoms in objectively confirmed bacterial, viral or other form of meningitis in children. The diagnostic gold standard for meningitis was laboratory analysis of cerebrospinal fluid. Two authors independently assessed study inclusion, quality rating and data extraction. Data analysis consisted of calculation of likelihood ratios (LRs), sensitivities and specificities for each individual sign or symptom. **Results:** The search yielded 12,685 references which were screened for relevance by title and abstract. Of these, 906 articles were obtained for close review. Twelve articles (9 prospective), published between 1986 and 2001 and containing 5,433 study subjects (3,910 Africans, 549 Europeans, 642 Papua New Guineans and 332 Americans), met inclusion criteria. Ages ranged from 1 day 17 years. Most children presented to pediatric emergency departments with signs or symptoms attributable to meningitis. Data for 39 signs and 21 symptoms were found. Three items had LRs above 20: appears sick (LR 295; 95% CI, 132–661), cyanosis (LR 50; 95% CI, 3–850) and high tone (LR 21.5; 95% CI, 15–30). Thirteen items had LRs between 5 and 20 while only 4 signs had LRs less than 1: simple seizures, chest indrawing, fever and enlarged node. **Conclusions:** Many useful examination signs and symptoms exist to aid in the diagnosis of acute meningitis in children. Varying descriptions of the same phenomena across studies make combination of data for useful interpretation challenging. **Key words:** children, meningitis, systematic-review

**158**

**Childhood fractures appear to be heritable: a genetic epidemiology study.**

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**Introduction:** Childhood fractures are common, a significant cause of morbidity and are costly to society. The importance of genetic factors in childhood fractures have not yet been evaluated. The objective of this study was to determine if a familial tendency to fracture exists and to assess the relative role of environmental factors in determination of fracture risk. **Methods:** Healthy children presenting to the pediatric emergency department with fracture as well as fracture-free controls were consecutively enrolled in this case control study. Participants and both parents were asked to complete a questionnaire about their medical and fracture history including information relevant to risk factors for fracture. **Results:** Data was obtained from 79 cases (mean age 8.5 years) and 71 controls (mean age 9.1 years). Boys made up 63% of the fracture group and 52% of the control group. Of the cases, 74/158 (46.8%) parents (30 mothers and 43 fathers) had sustained fractures as compared to 44/142 (31.0%) parents (16 mothers and 28 fathers) in the control group; $p = 0.007$. Thus children with fractures were much more likely to have parental history of fracture. If a childs mother had fractured the OR (Odds Ratio) for fracture for that child was 2.1 (95% CI 1.026, 4.318); $p = 0.0356$. If a childs father had fractured the OR for fracture for that child was 1.8 (95% CI 0.958, 3.514); $p = 0.459$. If both parents had sustained a fracture the OR for fracture for that child was 3.0 (95% CI 1.1, 8.023); p= 0.0203. T-test and regression analysis revealed that cases and controls did not differ with respect to potential environmental influences on fracture risk such as dietary factors and levels of activity. **Conclusions:** Childhood fractures appear to be heritable, a feature which is independent of the environmental risk factors for fracture. This study provides important evidence supporting the need to further investigate the genetic basis of common childhood fractures. **Key words:** children, injury, epidemiology

**159**

**Use of single-dose activated charcoal among emergency physicians in the pediatric emergency department.**

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**Introduction:** Gastric decontamination with single-dose activated charcoal (SDAC) is a mainstay in emergency department (ED) treatment of ingestions. Guidelines published in 2005 encourage practitioners to use SDAC only in toxic ingestions presenting within one hour. Despite these guidelines, adult studies demonstrate a significant lack of consensus. This study examined the proposed use of SDAC for gastric decontamination in common pediatric ingestion scenarios by emergency physicians working in Canadian pediatric EDs. **Methods:** A standardized survey consisting of 5 clinical scenarios was mailed to all physicians with a primary clinical appointment to the ED at 9 Canadian children's hospitals. **Results:** One hundred and thirty-one physicians were surveyed and 95 (72%) responded. The majority of respondents were pediatricians (68.1%) with a mean of 15.0 years of experience (SD 6.8 years). Of those surveyed, 91 (97.8%) would use SDAC for a toxic ingestion presenting in less than 1 hour, 35 (36.8%) would use SDAC for a toxic ingestion presenting after 3 hours, 61 (64.9%) would use SDAC for a non-toxic exploratory ingestion presenting in less than 1 hour and 29 (30.5%) would use SDAC for a non-toxic mixed ingestion presenting at an unknown time. Eleven (11.7%) would use SDAC for an ingestion of a substance that does not adsorb to SDAC. **Conclusions:** There is variation in the use of SDAC among emergency physicians working in Canadian pediatric emergency departments. This variation suggests that optimal management is not clear and that continued education and research are required. **Key words:** children, activated charcoal, survey

**160**

**Rapid IV rehydration using dextrose in children with gastroenteritis who have failed oral rehydration.**

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**Introduction:** Gastroenteritis is a common pediatric problem presenting to the Emergency Department. Oral rehydration ther-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

apy (ORT) is sometimes unsuccessful in patients who have persistent vomiting or are unable to meet minimum ORT. These non-responding patients may benefit from the addition of IV dextrose to a rapid intravenous rehydration (RIR) protocol. **Methods:** Eligible children, aged 1 to 6 years with acute viral gastroenteritis who were mild to moderately dehydrated and had failed standard ORT, were randomized to 3 hrs of RIR with 5% dextrose/0.45% normal saline (D5W.45NS), RIR with 0.9% normal saline (NS), or ORT. Study personnel and parents were blinded to the treatment. IV fluids were given to all patients, with RIR groups receiving 10 mL/kg/hr and the ORT group receiving 10 mL/hr (minimum to keep vein open). Primary outcome was positive fluid balance and improved clinical signs of dehydration. Other outcomes included change in serum chemistry, length of stay, admission rates, duration of illness, return for medical attention and time to return of normal fluid intake and activity level. Telephone follow-up occurred at 24 and 72 hours. **Results:** 84 patients were enrolled: 32 received D5W.45NS, 24 NS and 28 ORT. Study groups were similar at baseline. There was no difference between groups for the primary outcome with all patients having improved fluid balance and/or clinical signs of dehydration. Length of stay was shorter in the D5W.45NS group, although not statistically significant. There were no significant differences in admission rates, serum chemistry, return for medical attention, duration of illness, and time to return of normal fluid intake. No patient became hyponatremic. Time to return of normal activity was slightly better in the D5W.45NS group, although not statistically significant. **Conclusions:** In this pilot study, RIR using a dextrose solution appeared to be as safe, although not more efficacious, than standard RIR and ORT in treating mild to moderate dehydration in children with gastroenteritis. **Key words:** children, gastroenteritis, rehydration

**161**

**Do trainees prolong the length of stay in the pediatric emergency department?**

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**Introduction:** Trainees are part of any academic emergency department (ED). Reviewing a patient might prolong the patient length of stay (LOS) resulting in increased cost and dissatisfaction. The aim of this study was to determine if children seen first by a trainee compared to children seen immediately by a Faculty member have a longer LOS and more lab tests, imaging studies, consultations and admissions. **Methods:** A retrospective chart review in a large pediatric academic center, with 24/7 coverage by PEM-trained Faculty in Toronto, Canada. We randomly chose 14 days during two months of the academic year 2004–5. We collected information on age, acuity, time of arrival, MD-time, and disposition, lab tests (blood work, urinalysis), imaging (x-ray, CT scan, ultrasound), consultations with sub-specialists and disposition. We excluded children seen directly by a sub-specialty service and those left without being seen (LWBS). We conducted a univariate analysis and a logistic regression analysis to compare patients seen first by a trainee to those seen only by a Faculty member. **Results:** During the study period, 785 (43%) and 1023 (57%) were seen first by a faculty and by a trainee, respectively. Trainees examined younger children ($p = 0.016$) with a higher acuity ($p < 0.0005$). The LOS of children seen first by trainees was 51 minutes longer than those seen first by faculty ($p < 0.0005$). The probability of ordering blood tests, urine tests and a consultation, as well as admission to the hospital was significantly larger if a patient was seen first by a trainee ($p < .0000$ to $p = 0.0475$). There was no significant difference in ordering imaging tests. **Conclusions:** patients seen first by a trainee have a significantly longer LOS and the probability of ordering blood and urine tests, requesting a consult from a sub-specialist and admitting a patient is greater. **Key words:** children, trainees, length of stay

**162**

**Outpatient management of non-facial cellulitis in children in a pediatric emergency department.**

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**Introduction:** To evaluate antibiotic choice, route of administration, time spent in the emergency department and outcomes of children treated as outpatients with non-facial cellulitis at a tertiary care center. **Methods:** Medical records of all children presenting with cellulitis over a three year period (January 01, 2000 – December 31, 2002) were reviewed. The practice of using twice daily cefazolin with probenecid was introduced over this time period. Charts selected for review were those with patients who were otherwise healthy, age 1–16 years old, and who had a discharge diagnosis of non-facial cellulitis by the emergency physician. **Results:** 269 charts met the inclusion criteria and were selected for review. The oral antibiotic most often prescribed was cephalexin (105). The intravenous antibiotic most often prescribed was cefazolin (124). In the intravenous group, 39 received cefazolin alone and 85 received cefazolin and probenecid. Table 1 summarizes the pertinent data.

**Table 1, Abstract 162. Summary of pertinent data**

| Route of administration, no. of patients | No. of ED visits | Time in ED (min) | Treatment failures (%) | Admissions to hospital (%) |
|---|---|---|---|---|
| IV, 152 | 3.4 (2.78) | 521.1 (287.05) | 21 (13.8) | 20 (13.2) |
| PO, 112 | 1.4 (0.98) | 164.2 (138.8) | 10 (8.9) | 3 (2.7) |

The cefazolin only group had a treatment failure and admission rate of 30.8%, where the cefazolin and probenecid group had a rate of only 8.2%. **Conclusions:** Non-facial cellulitis is most commonly treated using first generation cephalosporins. Patients treated with oral antibiotics had the least number of visits, time spent in the emergency department, treatment failures and admissions to hospital. Twice daily cefazolin and probenecid was associated with less treatment failures and admissions than cefazolin alone, and may be an equal or better alternative intravenous therapy plan for children with non-facial cellulitis. **Key words:** children, cellulitis, antibiotics

**164**

**Tasty treats: a palatability study of dexamethasone liquid verses prednisolone liquid in children with asthma in the pediatric emergency department.**

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**Introduction:** Palatability is a critical factor in medication compliance particularly in children where the acceptability of a liquid medication and hence its ease of administration will be greatly affected by its taste. Studies assessing the palatability of steroids in children



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

are limited. The purpose of this study was to determine which, if any of two steroid preparations, oral dexamethasone (DEX) and oral prednisolone (PRED), was most palatable to children requiring steroid treatment for asthma. **Methods:** A single-blind taste test of 2 different steroid suspensions, liquid prednisolone (1mg/ml) verses liquid dexamethasone (1mg/ml) was conducted in children presenting to the Pediatric Emergency Department with an exacerbation of asthma. After obtaining informed consent children received 2.5mls of either PRED or DEX, then were asked to score their impression of taste on a 10 cm Visual Analogue Scale (VAS). After cleansing of the palate they were given the other steroid and scored its taste on a VAS. **Results:** Forty children (58% male) were enrolled in the study. The mean age was 7 years with a range of 5 to 12 yrs. The mean VAS measurement for DEX was 6.7 cm (SD = 3.8 cm) whilst the mean VAS measurement for PRED was 5.3 cm (SD = 3.7 cm). This difference was not statistically significant ($p = 0.09$, paired samples t-test). The order in which the steroids were tasted did not have a significant impact on the scores. Males were much more likely to prefer the taste of DEX than females (mean score 8.0 cm vs 5.2 cm),(independent samples t test, $p = 0.03$). There was no gender preference for PRED. **Conclusions:** There was no statistically significant difference between the taste of DEX and PRED although there was a strong trend towards Dexamethasone as the preferred steroid among all pediatric patients with asthma. There was a significant difference between genders with males much more likely to prefer the taste of DEX when compared to females however there was no difference between gender with regards to the taste of PRED. **Key words:** children, steroids, asthma

**165**

**Prospective validation of the Pediatric Appendicitis Score (PAS).**

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**Introduction:** Appendicitis can be a difficult diagnosis in children. Clinical scores attempt to improve diagnostic accuracy but most are not unique to pediatrics and have not been consistently validated. The PAS performed well in the derivation study, but was administered by surgeons in a referred population. We aim to validate the PAS in a non-referred population by non-surgeons. **Methods:** A convenience sample of children, 4–18 yrs old, presenting to a pediatric ER with <72 hrs of abdominal pain and in whom a diagnosis of appendicitis was considered was prospectively evaluated. PAS components were collected by the treating physician who was blind to the scoring system. Interobserver assessment was completed when possible. Appendicitis was defined as appendectomy with positive histology. At 1 month, discharged patients were contacted to verify final outcome. Sensitivity, specificity and NPV of the score were calculated. Overall performance was assessed by the receiver operating characteristic (ROC) curve. **Results:** 246 children were enrolled from Nov 2003–Jul 2005. 84(34%) had pathology proven appendicitis. Mean PAS in children with and without appendicitis was 7.3 (SD 1.2) and 3.3 (SD 1.5) respectively ($p < 0.0001$). There was no difference in mean age, duration of symptoms or sex between groups. If a PAS of <5 was used to discharge patients without further investigation, 2 (2.4%) patients with appendicitis would have been discharged. At this cut point, the sensitivity was 97.6%, specificity 52.1% and NPV 97.7%. If a PAS of >7 determined need for appendectomy, 8 (4.9%) children would have undergone a negative appendectomy. At this point, the sensitivity was 54% and specificity 95%. The area under the ROC curve was 0.90. PAS interobserver scores were completed in 14.6% of patients. 94% of scores correlated within 2 points. **Conclusions:** The PAS is a useful tool in the evaluation of appendicitis. Scores <5 help rule out appendicitis while scores >7 help predict appendicitis. Patients with PAS 5–7 may need further radiological evaluation. **Key words:** children, appendicitis, score

**166**

**Abdominal CT scan in pediatric blunt abdominal trauma: the Hospital for Sick Children experience.**

Mikrogianakis A, Wu V, Wales P. Division of Paediatric Emergency Medicine, The Hospital for Sick Children, University Of Toronto, Toronto, Ont., *Canada*

**Introduction:** This study was performed to investigate the utility of abdominal CT imaging in pediatric trauma patients at Canada's largest tertiary care pediatric hospital. **Methods:** Retrospective review of The Hospital for Sick Children's internal trauma registry for all consecutive trauma team activations during which patients underwent an abdominal CT scan between April 1, 1998 and March 31, 2001. **Results:** A total of 560 trauma team activations occurred during this 3 year period. Three hundred and twelve children (55.7%) underwent evaluation with abdominal CT and had a mean ISS of 14. The CT scan was reported as normal in 167 (54%) of patients. On the 145 abnormal CT scans performed, intra-abdominal free fluid was the most common finding present on 115 (79.3%). Only 82/145 (57.6%) patients had a definite intra-abdominal injury documented on CT scan. Abdominal surgery was performed on 17/312 (5.4%) of all patients that underwent abdominal imaging. **Conclusions:** Over half of the abdominal CT scans performed on pediatric trauma patients at our institution were normal and another 23% of the CT scans did not contribute to the patient's final diagnosis. A better method of selecting patients for abdominal CT scan could decrease patient's radiation exposure as well as the overall costs to the health care system. **Key words:** Abdominal trauma, computerized tomography, children

**167**

**Pediatric blunt abdominal trauma: What are the injuries and who needs an operation?**

Mikrogianakis A, Wu V, Wales P. Division of Paediatric Emergency Medicine, The Hospital for Sick Children, University of Toronto, Toronto, Ont., *Canada*

**Introduction:** The purpose of this study was to quantify the intra-abdominal injuries suffered by children with blunt trauma and to identify the types of injuries that require surgical intervention. **Methods:** Retrospective review of The Hospital for Sick Children's internal trauma registry for all consecutive trauma team activations during which patients underwent an abdominal CT scan between April 1, 1998 and March 31, 2001. **Results:** A total of 560 trauma team activations occurred during this 3 year period. Three hundred and twelve children (55.7%) underwent evaluation with abdominal CT. An intra-abdominal injury was documented in 82/312 (26.3%) patients. The incidence of damage to specific organs was as follows: 32 spleen, 31 liver, 14 bowel or mesentery, 16 renal or adrenal, 5 pancreas and 3 bladder injuries. A total of 17/312 (5.4%) of all patients that underwent abdominal CT scan required surgical intervention for their injuries. All 17 patients requiring surgery had an abnormal abdominal examination as well as suspicious radiologic findings on CT scan. Ten of the patients had operations on their bowel. The liver was operated on twice, the spleen once and the bladder twice. Three of the exploratory laparotomies performed were normal. **Conclusions:** The incidence of abdominal surgery for pediatric blunt abdominal trauma at our institution is 5.4% of all abdominal CT scans performed. Most of the procedures performed (59%) involved the bowel. Injuries to the liver and spleen were the most prevalent but rarely required surgical intervention. **Key words:** Abdominal trauma, surgery, children



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

**168**

**External validation and modification of a pediatric trauma triage tool.**

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**Introduction:** Simon et al developed a simple secondary triage tool (mPTS) based on physiologic parameters and physical findings to identify pediatric trauma patients who had a low likelihood of serious injury. Such patients could be treated in the Emergency Room without full trauma activation. Our purpose was to apply the mPTS to the trauma population at Sick Kids. **Methods:** A retrospective cohort study of all trauma team activations at Sick Kids (1999–2002), excluding penetrating trauma and burns. Patients were stratified into high (ISS ≥ 12) and low-risk (ISS < 12) groups. The mPTS evaluates airway integrity, open wounds, neurological status, hemodynamics and skeletal integrity and applies a score of 1 point to each criterion. A score of 5 implies a low risk injury. **Results:** There were 628 trauma patients (382 males, mean age of 8 ± 3.8). The mPTS had a sensitivity of 92% and PPV of 47% when applied to our population. The mPTS missed 21 patients with significant injuries, many were intraabdominal. We modified the mPTS to include contusions to head &/or torso and a history of loss of consciousness and a 7 point score was developed. After modification the sensitivity was 0.99, specificity 0.21 and PPV of 0.46 with a 20% reduction in unnecessary trauma team activations. **Conclusions:** The original mPTS by Simon et al was not sensitive enough to be used as a reliable triage-screening tool for our population. The Sick Kids modification to the score improved the sensitivity to 99%. The PPV of 46% indicates that a safe level of over triage is maintained. The Sick Kids mPTS appears to reliably identify a subset of trauma patients at low-risk for serious injury, where full trauma team activation could be deferred. The Sick Kids mPTS remains easy to apply at the time of triage and would have reduced trauma team activation by 20%. **Key words:** trauma, triage, children

**169**

**Barriers to metered-dose inhaler/spacer (MDI+S) use in Canadian pediatric emergency departments (PEDs).**

Osmond MH, Gazarian M, Henry RL, Clifford T, Tetzlaff J, Pacheco SC, for the PERC Spacer Study Group. Division of Emergency Medicine, Department of Pediatrics, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** MDI+S are at least as effective as nebulizers (NEBS) for delivering beta-2-agonists to children with mild to moderate asthma exacerbations in the ED. They result in a shorter ED stay, fewer side effects and are preferred by parents. However the uptake of MDI+S in Canadian EDs appears to be slow. We aim:1) to describe current practice and beliefs with respect to MDI+S use in Canadian PEDs, and 2) to identify barriers to MDI+S use as perceived by pediatric emergency physicians (EP) and nurses (EN). **Methods:** We conducted a cross-sectional, mail survey of all pediatric EPs and a random sample of ENs at 10 Canadian PEDs. A modified version of Dillman s Survey Method was used. A descriptive analysis was performed. **Results:** 262 of 315 (84%) responded including 126 of 144 (88%) EPs and 136 of 171 (80%) ENs. Currently 21% of EPs use MDI+S to treat asthma in the ED. Most respondents believe MDI+S are at least as effective as NEBS (EPs 86%; ENs 60%), and that there is enough research evidence to justify switching to MDI+S (EPs 87%; ENs 60%). They also believe they have the knowledge and skills to use MDI+S in the ED (EPs 93% ENs 92%) and that compared with NEBS parents will find MDI+S both easier to deliver (EP 81%: EN 83%), and resulting in equal or better patient outcomes (EP 92%; EN 74%). The most important barriers to MDI+S use are: 1) For EPs: safety and feasibility of reusing spacers (78%), cost to ED (70%) and lack of an MD champion to affect change (54%); 2) For ENs: safety and feasibility of reusing spacers (81%), MDs who do not believe MDI+S are effective (78%) and parental expectations to be treated with NEBS (73%). Overall, 57% of EPs and 70% of ENs feel it is difficult to change practice in their ED. **Conclusions:** MDI+S are infrequently used to treat acute asthma in Canadian PEDs despite the fact that both EPs and ENs believe they are effective. Important barriers to using MDI+S are different for EPs and ENs, and should inform any future implementation strategy. **Key words:** asthma, metered-dose-inhaler, children

**170**

**Interobserver agreement in the assessment of children with minor head injury.**

Osmond MH, Klassen TP, Stiell IG, Correll R, Bailey B, Jarvis A, Joubert G, Kimoff L, McConnell D, Nijssen-Jordan C, Pusic M, Reed M, Silver N, Taylor B, for the CATCH Study Group. Division of Emergency Medicine, Department of Pediatrics, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** We aimed to determine the interobserver agreement in the MD assessment of clinical findings in children with minor head injury. This methodological sub-study was an important component in the derivation of a clinical decision rule for the Canadian Assessment of Tomography for Childhood Head Injury (CATCH) Study. **Methods:** This prospective cohort study was conducted in 9 Canadian pediatric teaching hospital EDs and involved children (0–16 years) with documented loss of consciousness, amnesia, disorientation, persistent vomiting ( ≥2 times) or irritability (children < 2) and a GCS score of 13–15. MDs evaluated patients for 28 standardized clinical findings before imaging and performed blinded inter-observer assessments when feasible. Analyses included the simple or weighted kappa coefficient with 95% CIs. **Results:** 640 assessments were conducted on 320 patients who were similar to the study population in mean age, sex, mechanism of injury, admission rate and brain injury on CT. Table 1 shows kappa values for clinical findings.

**Table 1, Abstract 170. Kappa values for clinical findings**

| Clinical finding | Kappa | 95% CI |
|---|---|---|
| Loss of consciousness | 0.65 | 0.56, 0.73 |
| Disorientation | 0.58 | 0.50, 0.66 |
| Any amnesia | 0.83 | 0.73, 0.94 |
| Irritability | 0.69 | 0.57, 0.81 |
| Headache | 0.53 | 0.44, 0.63 |
| Repeated vomiting | 0.92 | 0.87, 0.96 |
| Pallor | 0.26 | 0.14, 0.38 |
| Lethargy | 0.46 | 0.35, 0.58 |
| Hematoma | 0.60 | 0.51, 0.70 |
| Possible depressed # | 0.46 | 0.21, 0.71 |
| Signs basal skull # | 0.77 | 0.58, 0.97 |
| GCS-initial score | 0.60 | 0.45, 0.74 |

**Conclusions:** "Pallor" had poor agreement. Findings with moderate agreement were "possible depressed skull fracture", "lethargy", "headache" and "disorientation". Substantial agreement was found for most elements of the CATCH Rule, suggesting that physicians should be able to consistently interpret the overall rule. This reliability will be explicitly and prospectively evaluated in ongoing studies. **Key words:** trauma, head-injury, children

## RESUSCITATION TRACK

**173**

**Severe sepsis in the ED: a review of patient characteristics and initial management.**

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**Introduction:** Sophisticated goal directed therapy in the ED for severe sepsis has shown promise in recent studies. Prior to implementing such a resource intensive strategy, we undertook a review of patient and physician patterns as an initial step to optimizing fundamentals of ED diagnosis and management of the critically ill patient with sepsis. **Methods:** Retrospective chart review of all patients in a large urban centre admitted to the ICU from the ED with primary diagnosis of sepsis over 2000–2004. All values are reported as mean values. **Results:** We identified 188 patients and 154 charts were available for review. Patients' age was 61.8 years and 55.1% were male. Respiratory complaints (49%) were the most common presentation. CTAS score was 2.03. On arrival, vital signs were HR 108, SBP 114, temperature 37.6C, and RR 28. There was no temperature on arrival recorded for 41% of patients. Time to be seen by an MD was 17 minutes. Time to fluid resuscitation was 45 minutes. The amount of fluid given was 2.93L. Only 62% of patients received antibiotics in the ED, with an average door to needle time of 97 minutes. Procedures in the ED included intubation, central venous catheterization, and vasopressors, in 57, 42, and 51% of patients respectively. Only 2% received blood products. There were no CVP measurements or central venous gases drawn in the ED. APACHE II score was 22.1. No temperature was recorded during the entire ED stay in 32% of patients. Lactate level was 6.3, measured in only 25% of patients. WBC count was 15.5. An infectious ED discharge diagnosis was given in 76% of cases. Length of stay in the ED was 3h:41min, and in hospital was 17.1 days. Hospital mortality was 30.5%. **Conclusions:** These observational data suggest that improved diagnostic yield and treatment of severe sepsis in the ED may be achieved with routine temperature screening, consistent antibiotic administration and use of physiologic markers of shock. The heterogeneous management of this critical illness supports the use of a goal directed protocol. **Key words:** sepsis, emergency department, management

**180**

**Emergency physicians are ready to implement EGDT for sepsis in an academic tertiary care emergency department setting.**

Healey A, Pardham A, Upadhye S. Division of Emergency Medicine, McMaster University, Hamilton, Ont., *Canada*

**Introduction:** Recent attention has been placed on early goal-directed therapy (EGDT) for sepsis in the emergency department (ED). A mortality benefit and cost-savings has been demonstrated in the use of this therapy. The feasibility of implementing EGDT has not been established in a Canadian ED setting. **Methods:** Using a web-based survey, we employed a modified Dillman's Total Design Method to survey a group of full-time emergency physicians (EPs) working in a tertiary academic ED ($n$ = 53) regarding the treatment of sepsis. **Results:** We achieved a response rate of 75% (40/53). EPs felt that a combined strategy of measurement of venous lactate and monitoring for abnormal vital signs was the best strategy for identifying potentially septic adult patients. In pediatrics, 72% agreed that monitoring for abnormal vital signs was sufficient. Most EPs in this group were "comfortable" with necessary skills to provide EGDT in the ED or were open to training. Although all agreed that septic patients with respiratory compromise should be intubated, 87% of EPs would intubate patients in septic shock without respiratory compromise and 48% would intubate in clinically severe sepsis. Fewer EPs were comfortable with invasive pediatric procedures or the use of vasopressors in children, although 81% were comfortable managing the initial fluid resuscitation. The majority agree that the creation of an intensivist-lead sepsis team on-call would be the most appropriate method to manage these patients, but a small percentage believed that the EP should lead this team. Additional members of the team viewed as essential were the ICU nurse (88%), and respiratory therapist (91%). **Conclusions:** EPs in this institution are generally prepared to institute EGDT in this institution or are receptive to training. The vast majority believe a "sepsis-team on call" would be the best way to manage these patients. Further work is needed to determine feasibility of this therapy in terms of support staff and equipment availability. **Key words:** septis, goal directed therapy, resuscitation

## TOXICOLOGY TRACK

**185**

**A case of prolonged withdrawal from use of 1,4-butanediol complicated by seizure and rhabdomyolysis.**

Wojtowicz JM, Yarema MC, Wax PM. Department of Emergency Medicine, Calgary Health Region, Calgary, Alta., *Canada*

**Introduction:** 1,4-butanediol (1,4-BD) is an industrial solvent that is metabolized to gamma-hydroxybutyrate (GHB), a gamma-aminobutyric acid (GABA) agonist with depressant effects on the central nervous system. Although it was classified as a schedule I drug by the Drug Enforcement Agency in 2000 1,4-BD remains a popular drug of abuse. Withdrawal from 1,4-BD is characterized by autonomic instability and altered mental status. Previous reports have documented withdrawal symptoms lasting no more than five days and no reports have described the occurrence of seizure or rhabdomyolysis in association with withdrawal from 1,4-BD. **Methods:** Case report. **Results:** We report a case of withdrawal from 1,4-BD in a twenty-nine year old male who had abused 1,4-BD for the past several years. His last use of 1,4-BD occurred three days before presenting to hospital with a new onset of a generalized tonic–clonic seizure. Computerized tomography (CT) of his head was normal. His withdrawal course lasted six days and was further complicated by the occurrence of rhabdomyolysis, as demonstrated by elevation of his creatine kinase (CK) to 24,068 IU/L. Additional symptoms included tachycardia, hypertension, combative behavior, altered mental status and auditory hallucinations. GHB was detected by gas chromatography-mass spectrometry (GC-MS). The patient was treated with a total of 44mg of lorazepam, 27mg haloperidol and a bicarbonate infusion and recovered uneventfully. **Conclusions:** This case represents the longest documented case of withdrawal from 1,4-BD and represents the first occurrence of seizure and rhabdomyolysis in the setting of 1,4-BD withdrawal. With the emergence of 1,4-BD as a drug of abuse, emergency physicians must consider withdrawal from GHB and its analogues when patients present with clinical features suggestive of a sedative-hypnotic withdrawal syndrome. **Key words:** toxicology, rhabdomyolysis, 1,4-butanediol

**193**

**Adequacy of antidote stocking in British Columbia hospitals: the 2005 antidote stocking study.**

Wiens M, Zed PJ, Lepik KJ, Abu-Laban RB, Brubacher JR, Gorman SK, Kent DA, Purssell RA. CSU Pharmaceutical Sciences and Department of Emergency Medicine, Vancouver, BC, *Canada*

**Introduction:** Timely antidote administration is often required following a poisoning. Inadequate stocking of essential antidotes by



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

hospitals is well described and has been documented in the British Columbia (BC) antidote stocking study completed in 2000 which found that no BC hospital adequately stocked all 14 antidotes evaluated. The mean number of antidotes stocked was found to be 4.2 ± 2.9 per hospital. In response to this issue the BC Poison Control Centre (BCPCC) developed provincial antidote stocking guidelines in 2003. We sought to determine the current availability of 21 essential antidotes in acute care hospitals in BC. **Methods:** A two-part survey, consisting of hospital demographics and antidote stocking information, was distributed in 2005 to all acute care hospital pharmacy directors in BC. The antidotes examined and the definitions of adequacy were based on BCPCC guidelines. Standard descriptive statistics were generated. Availability was reported as number of antidotes stocked per hospital and proportion of hospitals stocking each antidote. **Results:** Surveys were completed for all 79 (100%) hospitals. A mean of 15.3 ± 4.8 antidotes were adequately stocked per hospital. Over 90% of hospitals had adequate stocks of N-acetylcysteine, activated charcoal, naloxone, flumazanil, calcium salts and vitamin K; >70–90% had adequate cyanide antidotes, ethanol/fomepizole, PEG solution, dextrose 50% and protamine sulfate; >50–70% had adequate atropine, deferoxamine, glucagon, leucovorin, methylene blue and pyridoxine; and <50% had adequate digoxin immune Fab, isoproterenol and pralidoxime. Only 5 (6.3%) hospitals sufficiently stocked all antidotes. **Conclusions:** Marked improvements have been achieved in antidote stocking in BC hospitals since the 2000 study, however over 90% of hospitals continue to stock insufficient quantities of at least some essential antidotes. Further improvements in BC hospitals antidote stocking are necessary to ensure optimal management of poisoned patients. **Key words:** toxicology, antidote, administration

**198**

**High dose insulin and glucose for calcium channel blocker overdose: a systematic review.**

Prediger LA, Yarema MC, Zed PJ. Department of Family Medicine, University of Calgary, Calgary, Alta., *Canada*

**Introduction:** We describe a systematic review of the efficacy and safety of high dose insulin and glucose (HDIG) for the treatment of acute calcium channel blocker (CCB) overdose. **Methods:** A systematic search of the literature was conducted; using electronic searches of MEDLINE, EMBASE, Cochrane, CCTR, IPA, Science Citation Index, LILAC, ClinicalTrials.gov, TOXLINE, Academic Search Premier and CINAHL databases, limited to human studies in English, literature on the use of HDIG in CCB overdose was identified. Hand searches of relevant chapters from toxicology and emergency medicine textbooks and bibliographies of pertinent journal articles were performed. Citations identified by the literature search were evaluated independently by all three authors for inclusion using title and abstract. Data collected included CCB ingested, use of conventional antidotes, HDIG regimen, and treatment duration. Efficacy outcomes included resolution of hypotension, therapies given after HDIG, and survival. Safety outcomes included clinically relevant hypoglycemia. **Results:** Nine studies with 16 cases of CCB overdose (13 adult, 3 pediatric) were identified. HDIG was most effective in treating hypotension ($n$ = 12). Three patients also converted to sinus rhythm from atrioventricular block; for two patients, this occurred within 15–60 minutes of starting HDIG. The duration of HDIG ranged from a single bolus to a 96 hour infusion, and the time to cessation of other therapies after initiation of HDIG ranged from 30 minutes to 90 hours. One patient received a norepinephrine infusion to maintain blood pressure after HDIG was discontinued. Adverse effects of HDIG included asymptomatic hypoglycemia ($n$ = 5), hypokalemia ($n$ = 4), hypophosphatemia ($n$ = 3) and hypomagnesemia ($n$ = 3). Thirteen patients survived; however, one patient remained in a vegetative state. **Conclusion:**: HDIG is a safe and effective treatment for acute CCB overdose. Further study is required to determine the most effective dose and its proper location within the CCB overdose treatment algorithm. **Key words:** insulin, antidote, toxicology

**199**

**Withdrawal from gamma-hydroxybutyrate, gamma-butyrolactone, and 1,4-butanediol: a systematic review.**

Wojtowicz JM, Yarema MC, Wax PM. Department of Family Medicine, University of Calgary, Calgary, Alta., *Canada*

**Introduction:** 1,4-butanediol (1,4-BD) is an industrial solvent that is metabolized to gamma-hydroxybutyrate (GHB), a gamma-aminobutyric acid (GABA) agonist and central nervous system depressant. GHB and its analogues are popular drugs of abuse. Withdrawal from these agents is characterized by autonomic instability and altered mental status. We describe a systematic review of this topic following a patient in withdrawal from 1,4-BD complicated by new onset of seizure and rhabdomyolysis. **Methods:** A systematic search of the literature on withdrawal from GHB, gamma butyrolactone (GBL), and 1,4-BD was conducted using electronic searches of MEDLINE, EMBASE, Cochrane, CCTR, IPA, and CINAHL databases, limited to human and English language. Reference list searches from leading toxicology textbooks and included articles were performed by two independent reviewers. Data collected included last use prior to symptom onset, clinical features on presentation, duration of symptoms, and outcome. **Results:** Twenty-eight studies with 57 episodes of withdrawal were identified. Thirty-six cases (63%) involved GHB, 18 (32%) involved GBL, and 3 cases (5%) involved 1,4-BD. The last use prior to symptom onset ranged from 20 minutes to 7 days for GHB, 5 hours to 8 days for GBL, and 6 hours to 3 days for 1,4-BD. The most common symptoms experienced by patients were: tremor (67%), hallucinations (62%), tachycardia (59%), insomnia (57%), anxiety (46%), hypertension (43%) and agitation (40%). Seizures and rhabdomyolysis occurred in 7% and 5% of cases, respectively. One death occurred. The duration of withdrawal symptoms ranged from 2 hours to 18 days for GHB, 6 hours to 11 days for GBL and 4 to 6 days for 1,4-BD. **Conclusions:** Withdrawal symptoms from GHB and its analogues are complex; however, death appears rare. As in the case presented, seizures and rhabdomyolysis may occur. Emergency physicians must consider withdrawal from these agents when patients present with clinical features suggestive of a sedative-hypnotic withdrawal syndrome. **Key words:** toxicology, 1,4-butanediol, systematic review

**200**

**The Narcotic Overdose Registry of Alberta (NORA).**

Dong KA, Blitz S, Rowe BH, Wild C. Departments of Public Health Sciences and Emergency Medicine, University of Alberta, Edmonton, Alta., *Canada*

**Introduction:** Death from drug overdose is a significant problem in North America. Fatal and non-fatal drug overdoses are particularly common among heroin users. Previous research is limited; however, suggests that most deaths do not occur immediately in otherwise healthy users and both formal and informal health service responses are often inadequate. This study describes the characteristics of fatal narcotic overdoses in a Canadian province. **Methods:** A retrospective study of all medical examiner cases from 2004 in the province of Alberta in which at least one narcotic medication was quantitatively identified at the time of autopsy. In this province, post-mortem toxicology screens are only obtained when drug use is suspected to have been involved in the cause of death. **Results:** A total of 352 charts were reviewed. The mean age of death was 45.2 years (SD

13.1 years), and 60% of cases were male. The vast majority of victims were Caucasian (84%) followed by Native Canadian (11%). Most deaths occurred at home (55%), in-hospital (20%) or in another private residence (18%); few (4%) occurred in a public place. Bystander CPR was performed in only 13% of all cases. The most commonly found co-ingestants were benzodiazepines, acetaminophen, alcohol and cocaine. **Conclusions:** Most deaths from drug overdose in this province occur in relatively young men in a private residence where rates of bystander CPR are low. Overdose prevention programs need to be targeted towards those individuals most likely to be present at an overdose – drug users and their acquaintances. Programs focused on general basic life support techniques as well as the use of antidotes appear to warrant further evaluation. **Key words:** toxicology, mortality, epidemiology

**201**
**The Narcotic Overdose Registry of Edmonton (NORE).**
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**Introduction:** Overdoses (ODs) are common among illicit opioid users and while many overdoses are witnessed by other drug users, health care responses are often sporadic or delayed. There is a need to develop innovative health promotion strategies to address the consequences associated with frequent overdose; however, little is known about the circumstances surrounding non-fatal opioid overdoses that present to the emergency department (ED). **Methods:** A retrospective study of all narcotic overdoses (ICD 10 codes 965.00 – 965.09) presenting to one of five participating EDs in the Capital Health (CH) region of Alberta in 2004 was conducted. CH provides services for almost 1 million people in northern Alberta and includes one large inner city teaching hospital where many ODs present. **Results:** A total of 563 charts were reviewed. The mean age of presentation was 37.0 years (SD 15.0 years), and 54% of patients were female. Most overdoses occurred at home or in another private residence (54%). The most common opioids in ODs were codeine, morphine and oxycodone; heroin ODs accounted for a small proportion of cases. Coingestants were common (85%) and most frequently included acetaminophen, alcohol and/or cocaine. EMS was called in 72% of cases; and 51% of all cases received triage scores of 1 or 2, requiring urgent assessment. Hospitalization occurred in 20% of cases while discharged patients stayed on average 9.4 hours in the ED; 0.5% died in the ED or after admission. **Conclusions:** Most narcotic overdoses that present to the ED occur in a private location and frequently include multiple drugs. Most patients require urgent assessment in the ED, consume valuable resources and contribute to ED overcrowding; fortunately, death appears rare. Overdose prevention programs should stress the dangers of mixing drugs, teach early overdose recognition and encourage early EMS activation. **Key words:** toxicology, mortality, epidemiology

**202**
**Antidote Kit Project.**
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**Introduction:** It has been well documented that antidotes stocked in Emergency Departments (EDs) are often inadequate in terms of antidote selection and quantity of antidotes. A survey of antidotes stocked in EDs in Capital Health (CH) and the Izaak Walton Killam Health Centre (IWK) identified the same deficiency within this district. **Method:** A collaborative team, consisting of representatives from CH, IWK and IWK Regional Poison Centre, was created to address this issue. Funding for the project was secured and the following components, integral to the project's success, were developed: district standards for required antidotes and quantities, a convenient high profile format (kit) for the storage of antidotes in EDs, a simple and efficient procedure for antidote kit replenishment, a district-wide policy and procedure for accessing additional antidotes in non-urgent and urgent situations and an educational resource (manual) containing information on the dosage and administration of antidotes. **Results:** The antidote kits were distributed to EDs over a nine-month period. As of December 2005, all EDs in CH and IWK have standardized antidotes in standardized quantities. This provides all patients access to life saving antidotes and ensures that the opportunity for treatment of poisonings/overdoses is consistent at all sites in CH and IWK. **Conclusion:** To date, nine patients have benefited from this quality improvement initiative. This project has contributed significantly to patient care at CH and IWK by providing the tools to enable healthcare professionals to save lives that may have previously been jeopardized. Evaluation Ongoing Complete Antidote Kit Project document is available upon request. **Key words:** toxicology, administration, antidote

**203**
**Therapeutic practices in recurrent methanol abusers in the Calgary Health Region.**
Haager MB, Berlin RJ, Yarema MC, Fong KK, Johnson DW. Division of Emergency Medicine, University of Calgary, Calgary, Alta., *Canada*

**Introduction:** While guidelines exist for the treatment of acute methanol toxicity, there are few recommendations for emergency department (ED) management of recurrent methanol abusers. The purpose of this study was to examine the relationship between serum MeOH levels and treatment interventions for 4 chronic methanol abusers in the Calgary Health Region (CHR). **Methods:** A retrospective review was conducted on all methanol-related visits to CHR facilities by 4 known recurrent abusers from 1997–2005. Data collected included treatment modalities, ED disposition, and length of stay (LOS). Outcome measures included treatment complications and clinical outcome. **Results:** 147 visits for MeOH ingestion were identified. The mean initial serum MeOH level was 11.3 mmol/l (range 2.0–50.0 mmol/L). 106 (72.1%) and 65 (44.2%) of visits were treated with intravenous ethanol (IV EtOH) and hemodialysis (HD) respectively. Considerable variation was observed in the serum MeOH levels which prompted initiation of therapy. The mean MeOH levels not resulting in IV EtOH and HD treatment were 7.5 mmol/L and 7.4 mmol/L respectively (range 2.0–18.0 mmol/L). The average LOS was 24.7 hrs (range 40 min–10 days). 109 (74.1%) of cases were treated entirely in the ED, 26 (17.7%) were admitted to the ICU, 24 (16.3%) to a general hospital bed, and 6 (4.1%) to psychiatry. Treatment complications included 3 (2%) bleeding episodes and 3 (2%) cases of hypoglycemia. There were no deaths. **Conclusions:** Treatment of recurrent methanol abusers in the CHR is highly variable. Apparent recovery after no therapy for levels as high as 18.0 mmol/L suggests that these patients may tolerate higher MeOH levels without developing toxicity. Further assessment of the costs related to these visits and the impact of using fomepizole instead of IV EtOH is required before treatment guidelines in this patient population can be developed. **Key words:** toxicology, methanol, epidemiology

## TRIAGE TRACK

**204**
**Are patients willing to wait as long as CTAS says they can?**
Bandiera G, Silver D. Division of Emergency Medicine, University of Toronto, Toronto, Ont., *Canada*



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

**Introduction:** The Canadian Emergency Department Triage and Acuity Scale (CTAS) was implemented in 2002 to standardize case severity definitions and provide guidelines for timely care of patients. Little is known about patient perceptions of CTAS guidelines. Objectives: To determine if the waiting time guidelines associated with CTAS meet patients' expectations of timely access to care in the emergency department and to explore what the potential health outcomes would be if patients do not receive care from a physician within the maximum time they are willing to wait. **Methods:** Sixty patients classified as CTAS Levels III, IV or V presenting consecutively to the St. Michael's Hospital (SMH) ED, over seven predetermined afternoons between January 24 and March 7, 2005 were interviewed using a predetermined fixed short answer survey. The amount of time patients felt was reasonable to wait for care and the maximum time that patients were willing to wait were compared to the time guidelines associated with patients' CTAS score. Patients were also asked in open question format what they would do if their maximum wait time was exceeded. **Results:** The CTAS time guidelines meet patients' expectations for timely access to care. The guidelines met the expectations for reasonable wait times in 90% of Level III patients, 94% of Level IV patients and 20% of the Level V patients (however, very few participants were classified as Level V). In addition, the guidelines met the expectations for maximum wait times in 100% of Levels III and IV patients, and 40% of the Level V patients. If not seen within their maximum stated waiting time, 35% of patients reported that they would leave the ED. **Conclusions:** This study highlights that the SMH ED must strive to meet the CTAS guidelines. In satisfying the guidelines, the SMH ED will also be meeting patients' expectations and therefore, providing timely access to care, and likely helping to prevent unnecessary morbidity and mortality. **Key words:** triage, guidelines, emergency department

**205**

**Sepsis and CTAS level in the emergency department.**

Stenstrom R, Grafstein E, Innes G, Hunte G, Harris D, Christenson J. Department of Emergency Medicine, St. Paul's Hospital, Vancouver; Faculty of Medicine, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** Successful treatment of severe sepsis in the emergency department (ED) is time-dependent. Early goal directed therapy (EGDT; Rivers et al.) initiated in the ED decreases mortality and morbidity. Given this urgency, combined with the high mortality associated with severe sepsis, potentially septic patients should be triaged with an appropriate CTAS (Canadian Emergency Department Triage and Acuity Scale) level, and seen within the recommended fractile time responses. The purpose of this study was to assess the CTAS level, time in minutes (mean) to MD and orders and admission rate in patients with an ED diagnosis of sepsis or severe sepsis, compared to all other ED patients. **Methods:** *Design:* Administrative database, historical cohort study performed in an urban, tertiary care ED (65,000 visits/year). All patients with an ED diagnosis of sepsis or severe sepsis between January 2001 and July 2005 were included ($n$ = 972). Outcomes for septic patients were compared to all other ED patients for the same time (N=238,939). **Results:** See Table 1. All patients with an ED diagnosis of sepsis were designated a CTAS Level III, IV or V, despite an admission rate 5 times greater than all other diagnoses combined (all CTAS levels = 15.1%; septic patients = 84.5%; $p < 0.0001$). A lower CTAS level was associated with longer times to physician assessment and initiation of orders ($p < 0.0001$). **Conclusion:** Currently, CTAS does not adequately reflect the urgency of the treatment of the septic patient. **Key words:** triage, administration, emergency department

**Table 1, Abstract 205.**

| CTAS level, type of patient | No. of patients | Admit, % | Time to MD, min | Time to orders, min |
|---|---|---|---|---|
| Level I | | | | |
| All patients | 1,577 | 46.9 | 12 | 12 |
| Septic | 30 | 93.3 | 8 | 24 |
| Level II | | | | |
| All patients | 26,362 | 34.1 | 28 | 30 |
| Septic | 107 | 92.5 | 26 | 24 |
| Level III | | | | |
| All patients | 76,874 | 23.4 | 37 | 54 |
| Septic | 519 | 92.7 | 36 | 55 |
| Level IV | | | | |
| All patients | 91,719 | 7.5 | 35 | 66 |
| Septic | 275 | 75.5 | 40 | 63 |
| Level V | | | | |
| All patients | 42,407 | 3.2 | 33 | 68 |
| Septic | 41 | 85.4 | 51 | 65 |

## Monday, June 5th: CAEP Poster Presentations

## INFECTIOUS DISEASE TRACK

**207**

**Prospective evaluation of the parental satisfaction with the outpatient management of moderate to severe cellulites.**

Gouin S, Chevalier I, Gauthier M., Division of Emergency Medicine, University of Montreal, Montreal, Que., *Canada*

**Introduction:** Few studies have reported the parental satisfaction with the delivery of pediatric outpatient care. We aim to describe the parental satisfaction of pediatric patients with moderate to severe cellulitis who were managed as outpatients. **Methods:** Prospective survey of all of the patients (3 months–18 years) with a presumed diagnosis of moderate to severe cellulitis made in a university-affiliated pediatric Emergency Department (ED) from Sept 2003 to Sept 2005, who were treated as outpatients. Patients came once daily for parenteral antibiotics at the hospital. Parental satisfaction with their ambulatory care experience was assessed through anonymous self-administered questionnaire consisting of 11 standardized questions. **Results:** During the study period, 92 patients were treated as outpatients with a presumed diagnosis of cellulitis. Nineteen patients eventually required an inpatient stay. A completed questionnaire was returned by 78 families (85% response rate). Overall 95% of the families rated their global appreciation as very good to excellent. Of the 28 patients (36%) who had been hospitalized in the past, 68% thought that their ambulatory care experience was much better than their hospital experience. Eighty-nine % of the families judged that the home discharge instructions given by the ED personnel were clear. Five % expressed worry at the thought of going home with a child who was still febrile and 9% with a child who had indwelling IV access. Only 4% of families were ever concerned or worried about reaching the medical and nursing staff of the unit. Four % of the families did have to contact the ambulatory care team after closing hours. In the future 31% of the families would prefer an inpatient stay over outpatient management. **Conclusions:** Overall the outpatient management of patients with cellulitis was reported as a satisfactory expe-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

rience by families. This study also identified parental expectations of ambulatory care, this information is useful in optimizing future services. **Key words:** cellulitus, treatment, emergency department

**208**

**Adequacy of respiratory isolation resources in Ontario emergency departments.**

Chenkin JS, Spence JM. Division of Emergency Medicine, University of Toronto, Toronto, Ont., *Canada*

**Introduction:** The isolation of patients with febrile respiratory illnesses who present to the Emergency Department (ED) has been used successfully to contain outbreaks of infectious disease. The Canadian SARS outbreak suggests that EDs may have a shortage of respiratory isolation resources. The purpose of this study is to determine whether EDs in Ontario have adequate number of respiratory isolation rooms. **Methods:** An online survey was developed and piloted by staff at two EDs. An list of all ED directors in Ontario with a valid email address was compiled from the CAEP registry. Using modified Dillman methodology, an anonymous internet-based survey was sent to ED directors in Ontario. Data was analyzed using Microsoft Excel. **Results:** 77/143 (54%) of physicians responded to the online survey. Ontario EDs have an average of 6.4 respiratory isolation rooms (range 0–33) and 2.5 negative-pressure isolation rooms (range 0–17). Four (5.2%) EDs have no isolation rooms and 14 (18%) have no negative-pressure rooms. Most responders reported that their isolation rooms had an average occupancy of 75–95% and an occupancy of >95% during influenza season. When isolation rooms are full, high-risk patients are commonly being placed in ED waiting rooms (80%) and in common areas of the ED (85%). 47% of ED directors reported that they had an inadequate number of respiratory isolation rooms in their department. 61% of respondents reported that a lack of funding was the largest barrier to the construction of new respiratory isolation rooms. **Conclusions:** A large proportion of EDs in Ontario report having an inadequate number of respiratory isolation rooms. This is leading to patients being placed in areas of the department where they are at high risk for contaminating other patients and healthcare workers. Lack of funding was the most commonly cited reason for inadequate isolation resources. In order to prevent future outbreaks, targeted funding should be allocated to retrofit EDs that have inadequate respiratory isolation rooms. **Key words:** emergency department, infectious disease, outbreak

**209**

**The effect of widespread restrictions on hospital utilization to control an infectious disease outbreak: lessons from the Toronto Severe Acute Respiratory Syndrome outbreak.**

Schull MJ, Stukel TA, Vermeulen MJ, Zwarenstein M, Alter D, Manuel D, Guttmann A, Laupacis A, Schwartz B. Institute for Clinical Evaluative Sciences, Toronto, Ont., *Canada*

**Introduction:** Efforts to control an outbreak of Severe Acute Respiratory Syndrome (SARS) in Toronto, Canada, led to the imposition of major restrictions on non-urgent use of hospital-based services; we sought to describe the impact of the restrictions on health care utilization. **Methods:** Population-based rates of hospital admissions, emergency department (ED) and outpatient visits, diagnostic testing and essential drug prescribing, adjusted for age and sex, in the Greater Toronto Area (GTA), and unaffected comparator regions, before, during and after the SARS outbreak (April 2001 to March 2004). **Results:** During the 4 months of restrictions in the GTA, overall and medical hospital admission rates fell by up to 12% and 11% respectively, elective surgical admissions by up to 22%; urgent surgical rates were unchanged. Elective cardiac revascularization procedure rates fell by as much as 66%; urgent procedure rates remained the same or increased, except for an initial decrease in percutaneous coronary interventions. Admission rates for some acute serious medical conditions decreased by 15% to 21%. High and low acuity ED visits fell by 37% and 14%, respectively. Inter-hospital transfers declined by up to 44%. Visits to specialists and outpatient diagnostic testing decreased (from 17% for electrocardiograms to 42% for magnetic resonance imaging). Results were similar across age and socioeconomic groups. Overall admission rates in the comparator regions were unchanged, although small decreases in elective procedures occurred. **Conclusions:** Restrictions on hospital utilization achieved substantial reductions in elective services, and modest reductions in overall admission rates. Spillover effects to non-hospital based health services and SARS unaffected regions were minimal and short-lived. However, brief reductions did occur in admissions of some acute serious conditions, high-acuity ED visits and inter-hospital transfers, suggesting that access to care for some potentially seriously ill patients was affected. **Key words:** severe acute respiratory syndrome, outbreak, emergency department

**213**

**A randomized controlled double blind trial of intravenous cefazolin versus oral moxifloxacin for the treatment of cellulitis in the emergency department.**

Stenstrom R, Grafstein E, Innes G, Huynh F, Brown G, Lo G, Christenson J, Saona R, Harris D, Hunte G. Department of Emergency Medicine, St. Paul's Hospital, Vancouver; Faculty of Medicine, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** Cellulitis is a common emergency department (ED) diagnosis treated with outpatient intravenous (IV) antibiotics, despite a lack of evidence supporting this practice. The purpose of this trial was to compare 400 mg of oral moxifloxacin and 1 gram of oral probenecid (Oral Group) once daily to 2 gms of IV cefazolin and 1 gm of oral probenecid once daily (IV group) for the treatment of cellulitis. **Methods:** A prospective, randomized, double blind, IRB-approved, controlled trial was conducted in an urban tertiary care hospital (65,000 ED visits/year). Patients with a diagnosis of cellulitis requiring outpatient IV antibiotics were randomized to receive 400 mg of oral moxifloxacin combined with 1 gm of oral probenecid and 2 gms of IV placebo once daily or 2 gms of IV cefazolin and 1 gm of oral probenecid with 400 mg oral placebo, once daily. Patients were assessed daily until the study medication was discontinued. Primary outcome: treatment failure (admission to hospital, change in IV antibiotic regimen, adverse event, inability to obtain IV access, specialist consultation, re-treatment within 14 days). Secondary outcomes: diameter of erythema, days of treatment. **Results:** Data were analyzed by intent to treat. 42 subjects were randomized to the oral group, 42 to IV. Demographic features of the groups were similar. Failure rate was 8/42 (19.1%) in the Oral group and 6/42 (14.3%) in the IV group ($p = 0.79$). Repeated measures ANOVA with diameter of affected area as the dependent variable and treatment and time (day 1, 2, 3) as the independent variables demonstrated a significant effect of time on diameter of the affected area ($F2, 164 = 57.2$; $p < 0.001$), no significant effects of treatment ($F1, 82 = 0.02$; $p = 0.89$) or treatment x time interaction ($F1, 162 = 0.18$; $p = 0.83$). Median days of treatment was 3 in both groups ($p = 0.86$). **Conclusion:** IV Treatment of cellulitis with cefazolin was not superior to oral moxifloxacin on the basis of treatment failure rate, reduction in area of erythema over time, or days of treatment required. **Key words:** cellulitus, randomised controlled trial, emergency department

**218**

**The risk of methicillin-resistant *staphylococcus aureus* (MRSA) infection based on previous MRSA colonization in emergency department (ED) patients.**



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

Stenstrom R, Grafstein E, Romney M, Innes G, Harris D, Hunte G. Department of Emergency Medicine, St. Paul's Hospital, Vancouver; University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** MRSA infections are increasingly common in the ED. Institutional identification and alert generation of MRSA status from any source usually means the maintenance of that alert in perpetuity. This has created an increase use in empiric vancomycin therapy for patients with new infections and a previous MRSA alert. Our objective was to determine the infectious etiology of wound cultures in patients with MRSA alerts presenting to the ED. **Methods:** This was a historical cohort study using an ED administrative database. All patients with patients presenting to an urban Canadian tertiary care emergency department (60,000 visits/year) between Jan 2003–Jan 2005 with a discharge diagnosis of skin and soft tissue infection (SSTI) (ICD-9 682.9) were included. Linkage with the hospital microbiology database allowed identification of a) all patients with a previous MRSA alert and b) culture results for those patients who had wound cultures while in the ED. **Results:** 144 patients with a pre-existing MRSA alert had subsequent wound cultures in the ED. Of patients who were MRSA positive > 1 year, 34% were MRSA positive on repeat culture versus 62.6% of those patients MRSA positive for < 1 year (OR = 3.2; 95% CI = 1.4–5.7). In 76 patients with an existing MRSA alert who were diagnosed with cellulitis or abscess 58% were MRSA positive and 42% were MRSA negative. **Conclusion:** MRSA Alerts do not predict the likelihood of having MRSA positive ED wound culture. The further the length of time from the generation of an MRSA alert, the greater the likelihood that the infection is not from MRSA. **Key words:** methicillin resistant, *staphylococcus aureus*, emergency department

## PAIN TRACK

### 220

**Sucrose and/or pacifier as analgesia for infants receiving venipuncture in a pediatric emergency department.**

Curtis SJ, Jou H, Ali S, Vandermeer B, Klassen TP. Division of Pediatric Emergency Medicine, Stollery Children, Edmonton, Alta., *Canada*

**Introduction:** Previous studies have demonstrated the effectiveness of sucrose as analgesia, in the NICU population, mainly for the procedure of heel lance. To date, the effect of sucrose +/- pacifier for the procedural pain of venipuncture on infants in the pediatric emergency department had not been studied. **Methods:** Double blinded (sucrose) randomized control trial, factorial design. Eighty-four patients were randomly assigned to one of four groups as follows: a) sucrose b) sucrose & pacifier c) control d) control & pacifier. Each child received 2 ml of either 44% sucrose (case) or sterile water (control), PO, 2 minutes prior to venipuncture. A research nurse recorded pain scores and heart rate before and after the procedure, as well as crying time after venipuncture. Primary outcome: Faces, Legs, Activity, Cry and Consolability (FLACC) pain scale score. Secondary outcome: 1. Crying time 2. Heart Rate. **Results:** Age-adjusted regression analysis revealed that use of both sucrose (mean reduction 50 sec, $p < 0.0145$) and pacifier (mean reduction 64 sec, $p < 0.0018$) independently decreased crying time after venipuncture in infants 0–6 months in the pediatric emergency department. FLACC score and heart rate were not significantly affected by either intervention. For pacifier use, subgroup t-test analysis revealed a mean crying time difference of 77 sec ($p < 0.0171$) in the 0–1 month group, 124 sec ($p < 0.0029$)in the 1–3 month group and no significant effect in the greater than 3 months group. By t-test analyis the use of sucrose resulted in lower pain scores, crying time and heart rates although statistical significance was not achieved. Further analysis revealed that as post natal age and gestational age increased, so did crying time in response to pain. **Conclusions:** The effects of nonnutritive sucking appear to significantly decrease pain experienced from venipuncture for infants 0–3 months. Sucrose (44%) also appears to be beneficial although further study is needed to clarify age and treating environment-related effects. **Key words:** pain, pediatrics, randomised controlled trial

### 223

**Impact of a pain management practice guideline on narcotic administration in emergency department patients undergoing trauma team activation.**

Harrison DW, Zed PJ, Abu-Laban RB, van Beek CA, McLaughlin M, Taula T. Department of Emergency Medicine & Hyperbaric Unit, Vancouver General Hospital; Division of Emergency Medicine, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** Numerous studies have found suboptimal analgesic use in emergency department (ED) patients. We sought to determine the impact of a pain management practice guideline (PG) for major trauma patients at a tertiary hospital. Our primary hypothesis was that the PG would result in at least a 30% relative reduction in the median time to analgesic administration (a difference deemed a priori to be clinically significant). **Methods:** An interdisciplinary team developed and disseminated a pain management PG that categorized trauma patients into three groups based on hemodynamic stability. Charts of all patients associated with a trauma team activation over a three-period time series were reviewed using explicit criteria: the 6 months immediately prior to and 6 months immediately after release of the PG (P#1 and P#2); and the 6 months commencing 18 months after release of the PG (P#3). **Results:** 252 patients were enrolled between 2002 and 2004 (P#1 $n = 81$, P#2 $n = 2$, P#3 $n = 89$). There was an increase in the proportion of patients receiving analgesics between P#1 and P#2, which was not sustained in P#3 (59.3%, 74.4%, and 51.7% respectively). The median (mean) time from arrival to an ED stretcher to first analgesic was 39.5 (76.6) minutes in P#1; 20.0 (47.5) minutes in P#2; and 25.5 (59.3) minutes in P#3 ($p = 0.077$ by Kruskal–Wallis Test for overall downward trend). The reduction in the median time to first analgesic between P#1 and P#3 was 35.4% (absolute reduction 14 minutes). Use of fentanyl as the first drug, advocated by the PG over other agents due to its rapid onset, increased throughout the study periods (P#1: 37.5%, P#2: 50.8%, and P#3: 56.5%). A trend towards a decrease in the time interval between repeat drug doses across the study periods was also observed. **Conclusions:** Implementation of a pain management PG for trauma patients at our institution resulted in sustained clinically significant improvements in analgesic administration that trended towards statistical significance. **Key words:** pain, trauma, emergency department

### 224

**Venepunctures in the pediatric emergency department: automating the teaching of coping.**

Moon EC, McGrath PJ, Fitzpatrick EA, Sinclair D, Chambers CT. Department of Psychology, Dalhousie University, Halifax, NS, *Canada*

**Introduction:** Seventy-five percent of children in the emergency department (ED) experience clinically significant levels of pain during their stay (Chambers et al., 2003). Parent-guided cognitive-behavioural interventions such as distraction may be useful for reducing pain and anxiety in children undergoing medical procedures (Hardial et al.,

2004). The number of staff and the demands of the ED make it difficult to maintain a system for training parents how to implement cognitive-behavioural interventions with their children. In the current pilot study, we created an automated (DVD-based) intervention program in parent-guided distraction and relaxation techniques to reduce venepuncture-related child pain and anxiety in the ED. **Methods:** Twenty children (14 M; 6 F) between the ages of 6 and 13 participated in this study. All of the children received the DVD-based intervention, which consisted of two brief DVDs. The first DVD instructed parents and children on how to reduce child pain and anxiety associated with venepunctures. The second DVD was an animated short film that was used as a distraction tool during the venepunctures. **Results:** The DVD-based intervention program worked well and was easily incorporated into the ED routine. The mean of the child anxiety ratings was 3.7 (SD = 3.1) on a numerical rating scale and the mean of the child pain ratings was 3.2 (SD = 2.3) on the Faces Pain Scale-Revised (Hicks et al., 2001). **Conclusions:** This pilot study demonstrated that the DVD-based intervention program was feasible in a busy ED setting. The mean pain rating was on the borderline of our pre-determined cut-off scores for treatment efficacy; however, the small sample size and lack of control group in the current study prevent us from drawing any firm conclusions about the success of the program. A larger randomized controlled trial of the program is currently underway. **Key words:** pain, pediatrics, venepuncture

# Tuesday, June 6th: CAEP Poster Presentations

## ADMINISTRATION TRACK

**232**

**Who is dissatisfied with emergency department care? An analysis of the association between unmet health care needs and dissatisfaction with care in the emergency department.**

Harris DR, Koehoorn M, Hogg B, Innes G. Department of Emergency Medicine, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** Satisfaction with emergency department (ED) care has commonly been examined with respect to system factors, such as wait times. Patient factors such as individual health needs, health status, or sociodemographic characteristics may influence patient satisfaction with ED care. The objective of this study was to investigate the association between patients' perceived unmet health care needs and dissatisfaction with ED care, adjusted for health status and sociodemographic factors. **Methods:** This was an analysis of a large cross-sectional health survey, the Canadian Community Health Survey (CCHS) Cycle 2.1, administered in 2003 by Statistics Canada. The study population consisted of a subset of respondents of the CCHS who reported receiving medical care in an emergency department. The study outcome variable was satisfaction with care received (satisfied/dissatisfied) in the emergency department. The primary explanatory variable was self-perceived unmet health care needs (met/unmet). Sociodemographic, health care utilization, and health status indicator variables that may have a relationship to satisfaction were adjusted for in the analysis. Univariate and multivariable logistic regression was employed to examine possible associations between patient factors and dissatisfaction with ED care. **Results:** Dissatisfaction was associated with unmet health care needs (adjusted odds ratio = 2.34; 95% confidence interval [1.81, 3.01]). After adjustment, being female, aged 30–54 and in the highest income category were all associated with a statistically significant increased risk of reporting being dissatisfied. Those who reported consuming two or more alcoholic drinks per day and those with difficulty performing daily activities were also more likely to report being dissatisfied. **Conclusions:** Patient factors do play a role in reporting dissatisfaction with ED services. Interventions to improve satisfaction in emergency departments should be tailored to patient expectations recognizing patient demographics. **Key words:** emergency department; patient satisfaction; health care needs.

**233**

**Are patients with chronic illness less satisfied with emergency department medical care?**

Harris DR, Koehoorn M, Innes G, Stenstrom R. Department of Emergency Medicine, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** The current literature is not clear about the role that patient health status has on satisfaction with emergency department (ED) medical care. The objective of this study was to investigate the association between chronic illness and dissatisfaction with ED care, adjusted for sociodemographic factors. **Methods:** This was an analysis of a large cross-sectional health survey, the Canadian Community Health Survey (CCHS) Cycle 2.1, administered in 2003 by Statistics Canada. The study population consisted of a subset of respondents of the CCHS who reported receiving medical care in an emergency department. The study outcome variable was satisfaction with care received (satisfied/dissatisfied) in the emergency department. The primary explanatory variable was the self-reported presence of a chronic condition (yes/no). Self-rated health, self-rated mental health, specific chronic conditions and sociodemographic variables that may have a relationship to satisfaction were adjusted for in the analysis. Univariate and multivariable logistic regression was employed to examine possible associations between these factors and dissatisfaction with ED care. **Results:** Our study population included 1,966 respondents. Dissatisfaction was not associated with the self-reported presence of a chronic condition (adjusted odds ratio = 0.88; 95% confidence interval (0.66, 1.16)). After adjustment, being young (less than 29 years old or 30 to 44 years old) and from the lowest or highest income category were the only patient factors that were associated with a statistically significant increased risk of reporting being dissatisfied. There was no association between any of the selected chronic diseases and dissatisfaction with ED care. **Conclusions:** Contrary to some of the published literature, our study found that patients with chronic conditions are not more likely to be dissatisfied with ED care. **Key words:** emergency department; patient satisfaction; chronic illness

**236**

**Emergency department wait times prolonged by elective medical and surgical admissions.**

Langhan TS, McLoughlin K, Yarema MC, Curry DG. Department of Emergency Medicine, University of Calgary, Calgary, Alta., *Canada*

**Introduction:** Emergency departments across Canada continue to struggle with prolonged patient wait times. In a finite system, Emergency Departments compete for acute care beds with elective admissions from other services. Elective surgical and medical admissions occur predominantly during the regular workweek. We examined the impact of elective admission volume on Emergency Department (ED) wait times in our center. **Methods:** A retrospective administrative database review of all adult admissions to acute care beds in the Calgary Health Region was conducted for the 2004 calendar year. The regional ED database was reviewed to collect data regarding ED admission wait times from time of admission decision to time of discharge from the ED. This data was correlated to the day-to-day vari-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

ability of elective acute care admissions by medical and surgical services. **Results:** In the Calgary Health Region during the 2004 calendar year, there were 102,575 adult admissions to acute care beds; of these 43,425 were admitted via the ED and 59,150 were elective medical and surgical admissions via other bed allocation procedures. The demand for acute care beds from the ED was 118.65 acute care bed requests per day (111.50–125.27, STD dev. 5.22). Elective acute care bed demands had a daily average of 161.64 (84.44–204.62, STD dev. 21.94). Elective acute care bed requests had wide variability associated with day of week. This daily variability showed a correlation with Emergency Department wait times. Waiting time data are in process of collection, values to follow in early 2006. **Conclusions:** Elective medical and surgical admissions are one of many contributing factors leading to Emergency Department overcrowding and prolonged wait times. A prospective study examining the effect of elective admission cancellations when the hospital approaches capacity should be undertaken to validate the association between elective admissions and prolonged Emergency Department waiting times. **Key words:** emergency department; waiting times; hospital admission

**237**

**Triage as a predictor of emergency physician workload.**

Dreyer JF, Zaric GS, McLeod SL, Anderson CK, Carter MW. Division of Emergency Medicine, University of Western Ontario, London, Ont., *Canada*

**Introduction:** The Canadian Emergency Department Triage and Acuity Scale (CTAS) is a 5 level triage tool used in Canadian Emergency Departments. This score is based primarily on patients' presenting complaints and symptoms. It is also used to determine emergency department physician staffing levels for a number of emergency departments (EDs) in Ontario. We sought to determine if CTAS is a good predictor of emergency physician (EP) workload (WL) and to determine if factors related to patient demographics, treatments, and the state of the ED contribute to EP workload. **Methods:** Eleven hospital-based EDs participated in this study. Data was collected on 11,716 patient encounters by research assistants (RAs) over 592 shifts. The RAs directly observed EPs for entire shifts and recorded on a moment-by-moment basis the activities of the physicians. The individual times of all physician activities associated with a given patient were summed to derive a directly observed estimate of the amount of EP time required to treat a patient. Times per patient were fitted to lognormal survival models to identify predictors of workload. **Results:** 11,716 patients were observed in this study. CTAS was shown to be a significant predictor of workload, both in univariate and multivariate analysis. Other patient variables that were significant predictors of EP WL included: patient age, mode of arrival, previous visit to the ED within 30 days, laboratory and imaging investigations, mental health, social work and medical/surgical consultations, residents of long-term care facility, discharge disposition, shift and hospital type, and absolute patient volume. **Conclusions:** CTAS alone is a significant predictor of EP workload, even when other factors related to patient demographics and treatment are considered. Models that use CTAS as well as other factors achieve a much better fit than those that use CTAS only. Additional factors should be considered when determining appropriate staffing levels in Ontario EDs. **Key words:** triage; emergency department; physician staffing; workload

**238**

**Emergency physician time by activity and hospital type.**

Dreyer JF, Zaric GS, McLeod SL, Anderson CK, Carter MW. Division of Emergency Medicine, University of Western Ontario, London, Ont., *Canada*

**Introduction:** The emergency department (ED) is an environment with a broad mix of patient types and acuity. In order to more accurately predict physician productivity we undertook an analysis of the distribution of emergency physician (EP) time by activity during a shift. **Methods:** Eleven EDs participated in this study. Hospitals were divided into peer groups and were classified as being either teaching, rural or community institutions. We visited four teaching, five community and two rural EDs. Research assistants (RAs) collected data on handheld Personal Digital Assistants (PDAs) using specially developed custom software. The RAs directly observed EPs for 592 shifts around the clock, and recorded on a moment-by-moment basis the activities of the physicians. **Results:** On average, across all sites 84.2% of an EP shift was spent caring for patients. EPs spent the largest portion of their time in patients' rooms for all hospital types (rural 32.9%; community 41.2%; teaching 31.6%). EPs working in community hospitals spent more time charting (24.1%) than their colleagues in rural (17.4%) and teaching (17.6%) hospitals. Just over 13% of EP time in a teaching hospital is spent consulting with medical students and postgraduate trainees, compared to their colleagues at rural (0.6%) and community (3.0%) hospitals. Other EP time related to patient care represented 4.3% of a shift in rural and community hospitals, compared with 6.5% of an EP shift in the teaching hospitals. These times do not include walking from one area of the ED to another to see a patient. **Conclusions:** EPs spent very little time during their ED shifts in non patient-care related activity. Overall physician productivity of 84.2% was considered to be high. EP efficiency cannot be commented on in this study. **Key words:** emergency department; physician productivity

**239**

**Frequency, determinants, and impact of overcrowding in emergency departments in Canada: a national survey of emergency department directors.**

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**Introduction:** Several reports have documented the prevalence and severity of emergency department overcrowding (ED) at specific hospitals or cities in Canada; however, no study has examined the issue at a national level. The objective of this study was to describe the frequency, impact, and factors associated with ED overcrowding in Canada as perceived by ED directors. **Methods:** A descriptive, cross-sectional study was distributed to 243 ED directors in Canada using a 54-item self-administered postal or web-based questionnaire. Data collected included ED census and site characteristics, frequency, impact, and perceived causes of overcrowding. **Results:** The survey was completed by 158 (65% response rate) ED directors, and 62% reported overcrowding as a major or severe problem during the past year. Directors attributed overcrowding to a variety of issues including a lack of admitting beds (85%), lack of acute care beds (74%) and the increased length of stay of admitted patients in the ED (63%). The majority of ED directors perceived that ED overcrowding had a major impact on increasing stress among nurses (82%), ED waiting times (79%), the boarding of admitted patients in the ED while waiting for beds (67%), ED staff satisfaction (66%), and on increasing stress among physicians (65%). Most ED directors perceive access block or an insufficient number of inpatient beds to be the main cause of overcrowding. These respondents believe that overcrowding lowers both the quality and accessibility of emergency care, as well as increasing ED staff turnover. **Conclusions:** Overcrowding is a serious and frequent problem in EDs across Canada. It is not limited to large urban centres, nor is it limited to academic and teaching hospitals. ED directors' perspective on this problem reinforces the need for further examination of effective policies and in-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

terventions to reduce ED overcrowding. **Key words:** emergency department; overcrowding

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**Measuring overcrowding in emergency departments: a systematic review.**

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**Introduction:** Emergency department (ED) overcrowding is a term widely used to describe a situation where the demand for services exceeds the ED capacity. Relatively little is known about the characteristics of the measures that document this problem. This systematic review identified the measures used in the scientific literature on ED overcrowding. **Methods:** Searches of 24 electronic databases (up to December 2004) and grey literature were conducted. Studies were required to report measures of events related to ED overcrowding. Two reviewers independently assessed the relevance of the studies for the review. A qualitative synthesis of the results is presented. **Results:** The search yielded 486 potential studies of which 169 were included in the review. From these, 735 overcrowding measures were identified (median: 3/study; interquartile range: 2, 5). Operational definitions of ED overcrowding were infrequently reported (31%). The measures focused on delays in the ED care process (39.7%), overall volume of patients in the ED (11.6%), volume of patients waiting for care (8.8%) and the proportion of patients seen at different stages in the ED (7.6%). ED access block (7%), ambulance diversion (7%), patients who left without being seen (5.5%), and length of stay (4.2%) were less commonly reported. Throughput measures were commonly used (67.8%) followed by input and output measures (19.5% and 11.8%, respectively). System measures were reported less often (0.8%). **Conclusions:** There is no uniform definition of what ED overcrowding is, or how it can best be measured. Inconsistent use of definitions and measures has created a confusing and contradictory research base. There is little agreement on standardized definitions and measures that take into account regional variations and differences between individual EDs. Without a greater knowledge of the measurement properties of ED overcrowding measures, study results will remain difficult to interpret and of limited value to policy makers, clinicians, and patients. **Key words:** emergency department; overcrowding; methodology

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**Identification of measures to document overcrowding in Canadian emergency departments: a Delphi study.**

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**Introduction:** There is no uniform definition of emergency department (ED) overcrowding or how it should be measured. It is unclear what measures of ED overcrowding are important to researchers, ED providers, and administrators. The objective of the study was to obtain consensus among a group of Canadian ED experts on the relevance of a set of measures to document ED overcrowding. **Methods:** A two-round modified Delphi study was conducted from February to April 2005 to elicit and combine the judgments of 38 participants considered experts in some aspect of ED operations. Participants rated the relevance of 36 measures of ED overcrowding on a seven-point Likert scale and ranked the nominated measures according to their relative importance. Values for the mean score and standard deviation were chosen a priori to determine consensus. **Results:** The response rate was 87%. The most important measure identified was the percentage of the ED occupied by inpatients (mean on 7-point scale: 6.53, standard deviation (SD: 0.80). The other nine measures, in order of importance, were: total ED patients (mean: 6.35; SD: 0.75), total time in the ED (mean: 6.16; SD: 1.04), percentage of time ED is at or above capacity (mean: 6.16; SD: 1.08), overall bed occupancy (mean: 6.19; SD: 0.93), time from bed request to bed assignment (mean: 6.06; SD: 1.08), time from triage to care (mean: 5.84; SD: 1.08), physician satisfaction (mean: 5.84; SD: 1.22), time from bed availability to ward transfer (mean: 5.53; SD: 1.72), and number of staffed acute care beds (mean: 5.53; SD: 1.57). **Conclusions:** Ten relevant and clinically important measures of ED overcrowding were identified. This set of measures is concordant with indicators that researchers in other English-speaking countries have identified as important for documenting ED overcrowding. Measures developed by consensus techniques have face validity, but, to optimize their effectiveness for documenting ED overcrowding, they should be tested for acceptability, feasibility, reliability, sensitivity to change, and validity. **Key words:** emergency department; overcrowding; methodology

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**Interventions to reduce overcrowding in emergency departments.**

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**Introduction:** Various interventions have been used to address the problem of emergency department (ED) overcrowding; however, little is known about their effectiveness on reducing or controlling ED overcrowding. This systematic review identified interventions designed to reduce or control overcrowding in the ED from the scientific literature. **Methods:** Searches of 24 electronic databases (up to December 2004) and multiple grey literature sources were conducted. Studies were required to report data for interventions used to reduce or control events related to ED overcrowding. Two reviewers independently assessed the relevance of the studies for the review. A qualitative synthesis of the results is presented. **Results:** The search of over 12,000 citations yielded 169 potentially relevant studies of which 66 were included in the review. The number of interventions employed per study varied from 1 to 51. Interventions that targeted throughput processes were the most commonly studied (51 studies), followed by input (4 studies) and output (3 studies). The interventions studied were grouped as fast track (23 studies), multi-faceted interventions (12 studies), staffing changes (8 studies), triage (6 studies), diversion strategies (4 studies), physician order entry (3 studies) and short stay units (2 studies). Eight studies reported on unique single interventions that could not be placed in any of the above categories. **Conclusions:** A large number of interventions of varying complexity, intensity and duration have been applied in an attempt to alleviate or control ED overcrowding. The large majority of these have had a positive effect on the overcrowding outcome measured; however, it is difficult to determine the relative value of these interventions, and the lack of comparison studies makes it impossible to say which ones work best. There is a need for further studies on the specific effects of a variety of interventions and how they might impact the quality of care and patient outcomes. **Key words:** emergency department; overcrowding; literature review

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**Preferential access to health care: a survey of health care consumers regarding beliefs and practices.**

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https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

**Introduction:** We surveyed public impressions regarding preferential access to health care. **Methods:** Households were randomly selected from the Toronto telephone directory. English speakers age eighteen or older were solicited. Policy questions and case-based scenarios centered on "two tier medicine" and "queue jumping." **Results:** 15% ($n$ = 101) of 668 solicited were surveyed. 95% (CI [89%, 98%]) advocated equal access based on need. 77% (CI [68%, 84%]) agreed that allowing greater access for payment creates unfair disparities. 36% (CI% [27%, 46%]) supported being allowing payment for quicker access. Support for queue jumping in the ED was strong for cases of emergency (100%, [CI 96%, 100%]), severe pain (90%, CI [83%, 95%]) and pediatrics (83%, CI [74, 89%]), equivocal for police (50%, CI [40%, 60%]), and minimal for the homeless (20% CI [13%, 29%]), doctors (12%, CI [7%, 20%]), hospital administrators (6%, [2%, 12%]), and government officials (3%, [1%, 8%]). To improve a position on a waiting list, approximately half surveyed would call a friend who is a doctor (59%, CI [49%, 68%]), works for a doctor (48% [CI 38%, 58%]), or is a hospital administrator (45%, CI [36%, 55%]). 16% (CI [10%, 24%]) reported having done this. Likelihood of offering material inducement for preferential access was 30% (CI [22%, 40%) and 51% (CI [41%, 61%]), for low and high impact medical scenarios respectively. Likelihood to offer nonmaterial inducement was 56% (CI [46%, 65%]) and 71% (CI 61%, 79%). Responses were not associated with gender, occupation, or education. **Conclusions:** Respondents expressed support for equal access based on need. Policy and scenario type questions elicited different responses. Expressed beliefs may vary from personal practice. **Key words:** access to health care; public preferences

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**Consultations in the emergency department: exploring rates and complexity.**

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**Introduction:** Consultation is a common and important aspect of Emergency Medicine, yet surprisingly, little research has been conducted on this topic. Through both quantitative and qualitative methods, we prospectively examined consultation rates, processes and outcomes in two tertiary care hospitals in Canada. **Methods:** Emergency physicians volunteered to be involved in the study (11 at site 1, and 10 at site 2). Each physician recorded consultations during 5 randomly selected shifts over an eight week period. Physicians recorded information on all consultations using a standardized form within 24 hours of completing a study shift. Physicians were specifically asked about their prediction of need for admission, and if they experienced any difficulties with the consultation. Subsequent computer outcome data were extracted for each patient encounter. **Results:** From 105 shifts, involving 1930 patient encounters, at least 1 consultation was requested in 733 (38%) patients; rates did not vary between sites. Overall, 92% required a single consultation, 7% required 2 consultations, and 1% had 3 consultations. Study physicians were 94% accurate in predicting need for admission and 83% accurate in predicting no need for admission when compared to the final outcome. Of the 733 consultation requests, 43 (6%) of them were perceived as "difficult" by study physicians. An EP was more likely to report at least 1 difficult consultation during the shift at site 2 (18% vs 44%, $p$ = 0.005), during higher daily patient volumes (mean = 187 vs 196, $p$ = 0.03), and higher direct consultation cases (mean = 11 vs 14, $p$ = 0.001). On the patient level, only site 2 was associated with a difficult consultation (2.5% versus 9.8%, $p$ < 0.001). Age, gender and CTAS levels were not associated with difficult consultations. **Conclusions:** Consultation is a common process in the ED and difficult consultations are relatively uncommon. Knowledge of factors associated with difficult consultation may be useful in creating interventions to reduce them. **Key words:** emergency medicine; consultation

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**The influence of emergency department consultations on patient flow.**

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**Introduction:** Overcrowding is a common and potentially dangerous aspect of Emergency Department (ED) care in many locations. While many factors are involved, the role of consultations has been infrequently studied. This study examined the effect of consultation on patient flow through the ED in two tertiary care hospitals in Canada. **Methods:** Emergency physicians volunteered to be involved in the study (11 at site 1, and 10 at site 2). Each physician recorded consultations during 5 randomly selected shifts over an eight week period. Physicians recorded information on all consultations using a standardized form within 24 hours of completing a study shift. Physicians were specifically asked about their prediction of need for admission, and if they experienced any difficulties with the consultation. Subsequent computer outcome data were extracted for each patient encounter. **Results:** From 105 patients, at least one consultation was requested in 733 (38%) patients. Rate of consultation differed by CTAS level (I = 64% to V = 9%), and consulted patients were older (55 vs 42, $p$ < 0.001). Time from triage to assessment were shorter for RN (37 min vs 60 min; $p$ < 0.001) and MD (78 min vs 97 min; $p$ = 0.002) for consulted patients; however, time to disposition was longer (482 min vs 235 min; $p$ < 0.001). Median time from consult request to arrival was 174 min. Overall, 407 patients were admitted; all but 16 had a consultation reported. **Conclusions:** Patients who require consultation in the emergency department have significantly increased lengths of stay and often require admission. Interventions to reduce consultation delays and divert consultations from the ED appear warranted. **Key words:** emergency department; consultation; length of stay

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**Factors associated with emergency department length of stay in patients presenting with abdominal pain.**

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**Introduction:** Decreased throughput is one important factor related to emergency department (ED) over-crowding. Our objective was to determine the factors which are associated with ED length of stay (ED LOS) in patients with undifferentiated abdominal pain. **Methods:** 2288 Patients presenting to the emergency department from 2003–2005 with CTAS level III abdominal pain who were discharged home on that visit were included. Age > 60 years, gender, number of hospital encounters, having any blood test, an abdominal x-ray, ultrasound, or CT, the hour of the day, referral to a consultant, receiving a parenteral narcotic medication, number of emergency physicians (EPs) working in the department, and the aggregate acute ED volume were considered as potential predictor variables. **Results:** 2288 patients met the eligibility criteria. Range of ED LOS was 30 minutes to 48 hours (mean 4.4 hours; SD = 2.6 hours). Multiple linear regression with ED LOS as the dependent variable and the independent variables listed in Table 1 predicted 41% of the variation of ED LOS (F [7, 2278] = 157.1; $p$ < 0.001). The table summa-

rizes the contribution of each factor to ED LOS, adjusted for all other factors. **Conclusions:** When adjusted for age, narcotic administration, lab tests, x-ray use and number of EPs in the department, CT scan, ultrasound and referral to a consultant markedly increased ED LOS at our institution. If these processes could be expedited, ED throughput could be increased. **Key words:** emergency department; length of stay; abdominal pain

**Table 1, Abstract 249.**

| Variable | *N* (%) | Change in ED LOS | *p* value |
|---|---|---|---|
| CT scan | 199 (8.7) | + 3.4 h | <0.001 |
| Ultrasound | 297 (13.0) | + 2.3 h | <0.001 |
| Referred to consultant | 234 (10.3) | + 2.8 h | <0.001 |
| Lab tests | 1811 (79.2) | + 1.6 h | <0.001 |
| Parenteral narcotic | 816 (35.7) | + 1 h | <0.001 |
| X-ray | 841 (36.8) | + 0.9 h | <0.001 |
| No. of EPs (1,2 or 3) | n/a | – 0.6 h/ extra EP | <0.001 |
| Age >60 yr | 255 (11.1) | + 0.43 h | 0.027 |

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**Improving flow within the emergency department by matching physician staffing to patient demand.**

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**Introduction:** Previous studies of emergency department (ED) overcrowding have focused on factors beyond its control such as a lack of inpatient beds and delays in obtaining investigations and consultations. No study has examined the effect of targeted physician (MD) staffing on flow within the ED. In this study we identified a time of day when there was a consistently long wait between patients receiving a bed and seeing a physician and evaluated the impact of adding an additional shift during this time. **Methods:** Data were collected from a computerized database on patients visiting the ED at a tertiary care hospital. All CTAS II and III patients triaged to the main ED were included in the study. These data were used to identify a time period from 11am to 3pm when patients were waiting considerably longer to see a physician. A new shift was created to add another MD during this time. Data were analyzed for eight months before and after this intervention. Outcome measures included the change in time from bed assignment to physician sign-up (bed to MD time), the time from presentation at triage to physician sign-up (triage to MD time), and the total length of stay in the ED. **Results:** 98,901 patients visited the ED during the study period. Of these, 52,391 patients were included in the study. The additional physician coverage significantly reduced the median bed to MD time from 80 to 38 minutes ($p < 0.05$), and the median triage to MD time from 133 to 91 minutes ($p < 0.05$). These differences were sustained over the entire eight month post-intervention period. The median total length of stay in the emergency department decreased from 348 to 343 minutes ($p$ = NS). **Conclusions:** Using the bed assignment to physician signup time to address physician staffing resulted in a significant and sustained reduction in the amount of time patients waited before being seen by a physician. Further study is required to identify and improve the multiple factors contributing to total length of stay in the ED. **Key words:** emergency department; overcrowding; waiting time; physician staffing

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**The British Columbia Emergency Department Physician Workforce Study: operating characteristics and staffing patterns of emergency departments in British Columbia.**

Harris DR, Marsden J, Stenstrom R, Hamidizadeh R, Innes G, Christenson J, Hunte G, Newbery P. Department of Emergency Medicine, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** It is unclear how emergency departments (EDs) in British Columbia are staffed with physicians. This study sought to describe the operating characteristics and staffing patterns of EDs in BC. **Methods:** This was a cross-sectional survey in two parts: Part 1 was a telephone survey of all ED heads; Part 2 was a mail survey to all physicians who work in an ED in BC. In Part 1, ED heads were asked about the operating and staffing characteristics of their ED. EDs were identified from the BC Ministry of Health. An ED was defined as any publicly-funded facility that accepts and treats patients on an emergent basis. **Results:** 87 of 101 (86.1%) ED heads completed the survey. The median population served by EDs in BC was 20,000 (mean = 101,867) with a median 14,000 annual visits (mean = 19,000). Respondent sites had a median 22 inpatient beds (mean = 66) and 7 ED beds (mean = 11). 63/87 sites (72%) are open 24 hours; 30/87 sites (34.5%) have 24-hour physician coverage in house. 33/87 sites (37.9%) have in house physicians; 50/87 (57.5%) have on call physicians, and 5/87 (5.7%) have a combination of both. EDs with in house physicians had a median 14 physicians in their group, with a median 4 shifts per 24 hours – they worked a mean 44 hours per week. EDs with on call physicians had a median 5 physicians who worked a median 7.5 days per month on call and had a median 12 calls to the ED per day. 63/87 sites (71.5%) trained residents; 52/87 sites (60.0%) trained medical students. Larger sites (>14,000 annual visits ) were more likely to have emergency medicine specialty-trained physicians (Chi-square test = 88.4, $p < 0.0001$). Those sites that train residents were also more likely to have residency-trained physicians (Chi-square test = 12.9, $p < 0.001$). **Conclusions:** There is significant variability in the operating and staffing characteristics of emergency departments in BC. This information would help define the ideal staffing and resources required for EDs in BC and potentially at a national level. **Key words:** emergency department; physician staffing; resources

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**Impact of a multidisciplinary team on the performance of an academic emergency department.**

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**Introduction:** The province of Québec has been fraught with huge problems of flow in its EDs for the last decades. One of the proposed solutions from the government has been to put in place specialized workers such as pharmacists, social workers, nurse managers and medical coordinators to ease the flow of patients. The implementation of such a multidisciplinary team and its impact has not yet been studied. We postulated that a multidisciplinary team would have a positive impact on the current provincial indicators for ED flow and patient load. **Methods:** The impact of the implantation of a multidisciplinary team in 2005 on the performance of our ED was studied with data from the SIURGE software. We compared data on length of stay and proportions of stays of more than 24, 36 and 48 hours in 2005 with the identical data from the same period for the previous year. The chi-squared was used for $p$ value calculation. **Results:** 4,531 patients were stretcher bound in 2005 by comparison to 4,407 in 2004. Notwithstanding this increase of 124 patients (2,74%) be-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

tween the three months of the two reference years, the number of patients who stayed in the ED more than 24, 36 and 48 hours decreased by 14.7%, 33.3% and 58.3% respectively. The percentage of patients on a stretcher for more than 24 hours decreased from 12.68% to 9,98%, an absolute difference of 2.7% and a relative difference of 21.29% ($p < 0{,}0001$). The mean length of stay (for all ED patients) decreased from 6.79 to 6.10 hours. The global satisfaction regarding the implementation of the multidisciplinary team was positive, giving each ED physician a new perspective and some expertise on the managerial aspects of their clinical practice. **Conclusion:** The introduction of a multidisciplinary team had a positive impact on the performance of our ED according to provincial indicators for flow and patient load. **Key words:** emergency department; waiting times; lengths of stay; multidisciplinary teams; patient satisfaction

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**Consultation outcomes in the emergency department: a systematic review.**

Lee R, Woods R, Blitz S, Bullard M, Holroyd BR, Rowe BH. Department of Emergency Medicine, University of Alberta, Edmonton, Alta., *Canada*

**Introduction:** Consultation is a common and important aspect of Emergency practice. At times, consultations may excessively delay patient dispositions, which is a concern in an already overcrowded environment. This review evaluates the scientific evidence describing consultation in the ED and examining interventions to change consultation rates in this setting. **Methods:** Comprehensive searches of computer databases (e.g., EMBASE, MEDLINE, Cochrane Library, Web of Science, Health Star, and Google Scholar), the grey literature, reference lists and communication with authors were performed to identify eligible studies. Eligible studies involve patients presented in the emergency department. Two reviewers extracted the data from each study regarding the proportion of consultations in the emergency department or a specific patient sub-group. All study design types were considered for this review. Individual study proportions were calculated along with 95% confidence intervals (CI). **Results:** From more than 10,000 pre-screened citations, 51 were potentially relevant to the topic and 11 were included in the review (kappa = 0.71). Overall, 6 studies described consultations, 2 were follow-up studies and 3 examined interventions to improve consultations. All but 1 article was published in North America, and most studies examined distinct sub-populations of emergency patients (e.g., psychiatry referrals). Based on the available data it appears that consultation research has ceased since the mid-1990s. The rate of consultation varies widely based on the setting and the types of patients. For example, there is some evidence that consultation rates at urban tertiary care centers are higher than other locations. **Conclusion:** Consultation research in the emergency setting is limited and variable; interventions to change consultations are similarly rare. This systematic review outlines the state of the literature and suggests that further research is urgently needed. **Key words:** consultation, emergency medicine, systematic review

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**Inter-observer agreement in the assessment of headache patients with possible subarachnoid hemorrhage.**

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**Introduction:** We are developing a clinical decision rule for alert patients with an acute headache to rule out subarachnoid hemorrhage (SAH). In order to create a dependable rule, we evaluated the inter-observer agreement for potentially important variables from the history and exam. **Methods:** This prospective cohort study was conducted at 6 university tertiary care EDs. Patients >15 years, with normal neurological exam and a complaint of a non-traumatic acute (<1 hour to peak) headache were enrolled. Excluded were patients with a history of recurrent headaches, referral of confirmed SAH, papilledema, previous SAH or brain neoplasm. Two independent emergency physician assessments were completed prior to investigation. Analysis included simple kappa coefficients with 95% CIs. **Results:** See Table 1.

**Table 1, Abstract 265.**

| Variable | Kappa | 95% CI |
|---|---|---|
| Headache awoke patient | 0.93 | 0.84–1.0 |
| Loss of consciousness | 0.88 | 0.71–1.0 |
| Onset with sexual activity | 0.82 | 0.58–1.0 |
| Vomiting | 0.80 | 0.67–0.92 |
| Symptom of neck pain | 0.66 | 0.51–0.81 |
| Onset with exertion | 0.64 | 0.42–0.86 |
| Isolated to occipital area | 0.51 | 0.27–0.74 |
| Worse headache ever | 0.45 | 0.15–0.73 |
| Obliged to rest or legs buckled | 0.28 | 0.09–0.48 |
| Neck stiff on flexion/extension | 0.24 | 0.00–0.53 |

**Conclusion:** There was substantial agreement for onset with: headache awaking patient, transient loss of consciousness, onset with sexual activity, vomiting, symptom of neck pain and onset with exertion. Other variables had low inter-observer agreement and should not be considered for use in a decision rule. All clinical components of the proposed Canadian SAH Rule showed excellent inter-observer agreement thereby suggesting that physicians should be consistent in their evaluation of headache patients. **Key words:** subarachnoid hemorrhage, decision rules, headache

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**Perceived barriers to the implementation of the Canadian C-spine rule and the Canadian CT head rule.**

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**Introduction:** Successful implementation of clinical guidelines and decision rules requires active local strategies to overcome local barriers. We sought to determine the likely barriers to ED physician use for both the Canadian C-spine rule (CCR) and the Canadian CT head rule (CCHR). **Methods:** We conducted a survey of all attending and resident emergency physicians at 6 community and 6 teaching hospital EDs. The survey instrument was piloted on a group of 20 physicians. Local study nurses distributed the surveys and assured completion by physicians. Questions included demographics, practice patterns, 17 specific potential barriers, and the opportunity to add additional barriers and facilitators. We calculated descriptive and univariate analyses as appropriate for the data. **Results:** The 223 respondents, representing an 81% response rate, had these characteristics: mean age 39.7 years, male 78.8%, years in emergency medicine 9.5, attending physician 84.2%. Fifty-two and a half percent of physicians selected no potential barriers to using the rules with the remainder selecting the following (%): 1. other services will order anyway 20.2%; 2. forget the rule details 15.1%; 3. evidence for the rules flawed 5.0%; 4. no clinical advantage to using 2.5%; 5. rules take too much time 1.7%; 6. not safe for patients 1.7%; 7. resent rules and guidelines



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

0.8%. Examples of additional barriers included: "patient and family expectations", "lack of resident knowledge of rules". Potential facilitators included: "speeds patient removal from boards and discharge", "academic environment", "support of my peers". **Conclusions:** While a minority of physicians identified specific local barriers to implementation of the CCR and CCHR, important issues include the perception that other services will order imaging regardless and physician ability to remember the rules. Efforts to actively implement these and other ED guidelines should identify then address local barriers. **Key words:** clinical guidelines; emergency medicine; decision rules

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**Diagnosing cerebrovascular ischemia in the emergency department.**

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**Introduction:** Recent evidence suggests that patients presenting to the emergency department (ED) with a diagnosis of transient ischemic attack (TIA) are at significant risk of suffering a stroke within a short time. Accurate identification of TIAs and strokes is crucial to the management of these patients. We sought to determine the ability of emergency physicians to identify potential cerebrovascular ischemic events among patients presenting to the ED. **Methods:** A retrospective chart review of all ED referrals to a centralized stroke prevention clinic between July 1, 2003 – June 30, 2004 was performed. Four abstractors reviewed the data; three were blind to the study purpose, one was not. As part of the stroke clinic referral package, emergency physicians were asked to indicate on a 6-point Likert scale the likelihood that their patient had experienced a TIA or stroke. This score was compared to the final diagnosis assigned to the patient by a stroke clinic neurologist. **Results:** 170 charts were identified which met the inclusion criteria. The linear-weighted kappa score for blinded vs. unblinded data abstractors was determined to be very high (k = 0.91). Overall, 69% of referrals received a final diagnosis of ischemia. When analyzed according to the Likert value assigned by the emergency physician, the proportions of patients receiving a diagnosis of ischemia were as follows: Score = 6: 84%; Score = 5: 58%; Score = 4: 44%; Score ≤3: 9%. Among those patients misdiagnosed as ichemia in the ED, the most common diagnoses assigned by the neurologist were non-ischemic vertigo (16%), migraines (12%), non-neurogenic syncope, and anxiety (9% each). **Conclusions:** The initial assessment by an emergency physician correlates with the likelihood of a diagnosis of cerebrovascular ischemia. Our findings suggest that while emergency physicians' clinical impressions can be used to help risk stratify patients referred for follow-up in stroke prevention clinics, further evaluation will often reveal a non-ischemic diagnosis. **Key words:** cerebrovascular ischemia; emergency medicine; stroke prevention

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**The British Columbia Emergency Department Physician Workforce Study: current and projected emergency physician workforce requirements.**

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**Introduction:** It is unclear how many physicians practice emergency medicine in British Columbia and whether there is a need for more physicians to provide this care. This study sought to quantify current and projected needs for emergency physicians. **Methods:** This was a cross-sectional survey in two parts: Part 1 was a telephone survey of all emergency department (ED) heads; Part 2 was a mail survey to all physicians who work in an ED in BC. In Part 1, ED heads were asked to quantify the number of physicians currently working in their ED, the number of physicians they need to hire at present and over five years. In Part 2, individual physicians were asked about their future work plans. The number of individual physicians was determined from the initial ED chief telephone survey; all surveys were coded and anonymous. **Results:** 87/101 (86.1%) ED heads completed Part 1; 418/929 (45.0%) physicians completed Part 2. Thirty-eight percent of ED heads responded having problems staffing their ED with physicians; there was no difference between larger and smaller sites (chi-square 0.79, $p = 0.38$). Seventy-two and a half full-time physicians are needed at present; 196 physicians are needed over the next five years. The preferred qualifications for hiring are: family physicians with ATLS/ACLS certification – 33.7%; CCFP with enhanced skills – 18.1%; CCFP(EM) – 22.9%; FRCPC, ABEM or CCFP(EM) – 13.2% and; FRCPC – 6.0%. The average age of respondents was 44 years with 29.0% expecting to decrease their clinical workload over the next five years. Of those who plan to decrease their clinical workload, 93/121 (76.9%) practice in centers > 14,000 annual patient visits. Currently, BC produces 4 CCFP(EM) physicians and 3 FRCPC physicians per year. Based on estimated physician needs from this study, BC would have a shortfall of 160 emergency physicians over the next five years. **Conclusions:** Currently there is a need for more physicians to meet the EM needs in BC – more residency positions are needed and most of the residency positions should be CCFP(EM). **Key words:** emergency medicine; emergency physicians; staffing

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**The British Columbia Emergency Department Physician Workforce Study: Who is working in emergency departments in British Columbia?**

Harris DR, Marsden J, Stenstrom R, Hamidizadeh R, Innes G, Christenson J, Hunte G, Newbery P. Department of Emergency Medicine, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** It is unknown who practises emergency medicine (EM) in British Columbia in 2005. This study surveyed those physicians who provide medical care in emergency departments (EDs) in BC. **Methods:** This was a cross-sectional survey in two parts: Part 1 was a telephone survey of all ED heads; Part 2 was a mail survey to all physicians who work in an ED in BC. In Part 2, individual physicians were asked about their training experience, current work and future work plans. Physicians were identified from the initial ED chief telephone survey; all surveys were coded and anonymous. **Results:** 929 physicians practised EM, full- or part-time, in BC in 2005 – 418 (45.0%) completed the survey. 311/418 (74.4%) worked in EDs with >14,000 annual visits. Mean age was 44.1 years (sd 8.6) and 79% were male. Male emergency physicians (EPs) were older than female EPs (mean age = 45.1 vs. 39.7 years, $p < 0.0001$). 172/418 (41.1%) had some EM specialty designation (CCFP[EM], FRCPC or ABEM). Physicians who only worked in an ED worked a mean 29.7 hours/week (sd 10). 271/418 respondents (64.8%) work in other settings; 84% of them work as family physicians. Physicians who did not exclusively work in an ED worked a mean 19.3 hours/week in the ED (sd 13.8) and a mean 24.1 hours/week (sd 20.1) elsewhere. Respondents from the smaller centers spent a median 0 hours/week (mean =1.7) on research and teaching (IQR = 0–2 hours) whereas those from larger sites spent a median 2 hours/week (mean = 4.3; IQR 0–4 hours) – this difference was statistically significant (Mann–Whitney U Test $p < 0.001$). Twenty-four of 418 respondents (5.7%) planned more clinical work in the next 5 years; 121/418 (28.9%) planned less. Seventy-six of 418 respondents (18.2%) planned more non-clinical work in the next 5 years; 88/418 (21.1%) planned less. **Conclusions:** This is the first study to provide in-depth information regarding the characteristics of those providing



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

ED care throughout BC. This information will be vital to those charged with planning future physician needs in EM. **Key words:** emergency medicine; emergency physicians; staffing

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**Measuring the quality of stroke prevention care: performance in the emergency department.**

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**Introduction:** In Canada, stroke is the fourth leading cause of death and a leading cause of disability. Close to 50,000 strokes occur in Canada each year, and approximately 16,000 stroke victims die as a result of stroke or acute complications. Increasing evidence emphasizes the need for diagnostic evaluation and stroke prevention strategies to be delivered promptly after a cerebral ischemic event. The emergency department (ED) plays a critical role in initiating secondary prevention strategies for patients who present with stroke or TIA. A Canadian expert panel was convened that identified a core set of quality of care indicators for management of patients following stroke. Many of these indicators address care provided in the ED, including the timing and nature of evaluation for selected patient subgroups based on risk of future events. **Methods:** Using a modified Delphi process, a multidisciplinary panel of stroke experts and methodologists rated potential indicators based on the quality of currently available research evidence and on clinical experience. During a one-day meeting a core set of indicators were selected and a risk stratification model was identified that could be applied in ED assessment and management of stroke patients. **Results:** Several quality indicators were identified for secondary stroke prevention. A risk stratification model will enable practitioners to identify patients as emergent, urgent or semi-urgent, and could be used to guide timing of diagnostics and interventions such as neuroimaging, acute thrombolysis, antithrombotic therapy, lipid and hypertension management, and assessment for ongoing rehabilitation needs. **Conclusions:** This is the first comprehensive set of quality of care indicators for stroke prevention in Canada. They emphasize the need for rapid and appropriate assessment of suspected stroke, and will be used to establish benchmarks and standards for continuous quality improvement and monitoring of the performance of EDs, stroke centres and clinics. **Key words:** emergency medicine; stroke; risk stratification

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**Inter-rater reliabilities of the OQAQ checklist score compared to the OQAQ global scientific quality score among emergency physicians – a pilot study.**

Fan J, Cleve P, Upadhye S. Department of Emergency Medicine, McMaster University, Hamilton, Ont., *Canada*

**Introduction:** There is controversy regarding the most appropriate method of grading an article's scientific quality. Some favor checklists while others believe that a global score is more reliable. The overview quality assessment questionnaire (OQAQ) is a combined nine-item checklist scoring system with a 7-point global impression scale for systematic reviews. This study compares the inter-rater reliabilities of the OQAQ checklist scoring system against the OQAQ global impression scale. **Methods:** Systematic reviews relevant to emergency medicine published in 2005 were selected by consensus. Three raters independently completed standardized OQAQ forms to produce quality scores for each article. Raters were not blinded to the articles' citations. Inter-rater reliabilities were calculated using intra-class correlation coefficients type 2 (ICC) using raters as a random factor. Single rater and average ICCs among the 3 raters were calculated along with 95% confidence intervals. **Results:** Thirteen articles were reviewed. The single rater ICCs for the checklist and global scores were 0.27 (95% CI: 0–0.62) and 0.35 (95% CI: 0–0.68) respectively. The average ICCs for the checklist and global scores were 0.53 (95% CI: 0.16–0.79) and 0.62 (95% CI: 0.27–0.84) respectively. **Conclusions:** There were no inter-rater reliability differences between a checklist scoring system and a global impression scale for rating a systematic review's scientific quality; however, this study was limited by article and rater sample size. **Key words:** systematic review; inter-rater reliability; scientific quality scoring

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**Reliability of the QUOROM and OQAQ tools in evaluating systematic reviews in emergency medicine literature.**

Cleve PD, Fan J, Upadhye S. Department of Emergency Medicine, McMaster University, Hamilton, Ont., *Canada*

**Introduction:** High quality meta-analyses remain one of the strongest levels of evidence in medical literature. The overview quality assessment questionnaire (OQAQ) and the quality of reporting of meta-analyses (QUOROM) tools for evaluating the quality of meta-analyses were introduced in 1991 and 1999 respectively. The reliability of these tools has never been assessed. In this paper, we compare the inter-rater reliability of quantitative QUOROM and OQAQ scores in the emergency medicine literature. **Methods:** Systematic reviews relevant to emergency medicine from 2005 were randomly selected according to pre-determined inclusion criteria. Three trained independent evaluators scored the articles according to the OQAQ and QUOROM tools as published. The inter-rater reliability was calculated using intra-class correlation coefficients type 2 (ICC2). The overall scores and inter-rater reliability were reported. **Results:** The average total OQAQ score was 24.8 out of a possible 34 (summation of the checklist score and the overall impression score). The average QUOROM score was 16.2 out of a possible 18. For OQAQ, the ICC2(A,1) = 0.35 (95% CI: 0–0.68), while the ICC2(A,3) = 0.62 (95% CI: 0.36–0.84). For the quantitative QUOROM, the ICC2(A,1) = 0.08 (95% CI: 0–0.46), and ICC2(A,3) = 0.22 (95% CI: 0–0.58). **Conclusions:** The OQAQ and QUOROM tools provide a structured approach to evaluating the quality of meta-analyses, both of which require some knowledge of methodology to appropriately utilize. Of the 13 articles reviewed, overall quality was encouraging compared to previously published scores of systematic reviews using these tools. Both tools provided similar overall quality evaluations of the papers reviewed. However, the inter-rater correlation using the QUOROM tool was very poor. OQAQ correlation was better, however still sub-optimal. Further work is needed to ascertain how these tools perform in the hands of the "lay-reader." **Key words:** meta analyses; quality assessment; inter-rater reliability

## AIRWAY TRACK

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**A valved holding chamber (VHC) manufactured from non-electrostatic materials is more effective than non-conducting VHCs used out-of-package with pressurized metered dose inhalers (PMDIs).**

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**Introduction:** Manufacturers advise pre-washing VHCs with detergent to mitigate electrostatic charge that reduces medication delivery from PMDIs. These instructions may not be followed, particu-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

larly in the ED where time-to-treat is critical. We report a study in which delivery of a beta-2 agonist (Ventolin®) GSK plc, 100-µg/actuation salbutamol base equivalent ex metering valve) via a new VHC (AeroChamber® HOSPITAL Anti-static, Trudell Medical International [AC-H]) was compared with non-conducting VHCs (ProChamber™ [PRO], OptiChamber® Advantage [OPT], both Respironics Inc., SpaceChamber™ [SPC], PARI Respiratory Equipment Inc., Pocket Chamber™ [POC], Ferraris Medical Inc.) evaluated directly from their packaging. **Methods:** Fine particle mass (FPM) < 4.0 µm aerodynamic diameter was determined using a Next Generation Pharmaceutical Impactor ($n$ = 3 devices/group) at 30.0 L/min, following the procedure in Canadian Standard CAN/CSA/Z264.1–02:2002. Onset of sampling was delayed for 2-s or 5-s to simulate performance if PMDI actuation is not coordinated precisely with the onset of inhalation. **Results:** FPM[2-s delay] and FPM[5-s delay] (mean ± SD) ex AC-H were 27.3 ± 2.2 µg and 18.2 ± 0.9 µg respectively. These values compare with 2.1 ± 2.0 µg and 1.8 ± 0.5 µg (PRO); 3.5 ± 0.7 µg and 3.3 ± 0.3 µg (OPT); 3.5 ± 0.4 µg and 1.5 ± 0.1 µg (SPC); 2.7 ± 0.6 µg and 1.5 ± 0.4 µg (POC), representing FPM[2-s delay] and FPM[5-s delay] in each case respectively. **Conclusions:** Clinicians should be aware of the dosing implications from these data when prescribing VHCs, especially where there is the likelihood that pre-washing will not be performed. **Key words:** airway, asthma

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**The feasibility of developing novel clinical decision rules for patients with congestive heart failure or chronic obstructive pulmonary disease.**

Pan A, Stiell IG, Clement C. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** There are currently no widely accepted or validated guidelines on whether to admit patients presenting to the emergency department (ED) with either congestive heart failure (CHF) or chronic obstructive pulmonary disease (COPD). The aim of this study is to determine the feasibility of developing clinical decision rules for these conditions. **Methods:** This health records review included a consecutive sample of patients presenting with either CHF or COPD to a tertiary care ED over a four month period. Information reviewed included history (chief complaint, past medical history), medications, vital signs, and laboratory and diagnostic imaging investigations. The characteristics of patients with adverse outcomes (admission, BiPAP, intubation, myocardial infraction, relapse, or death) were compared to those without. Statistical analyses included Fisher's exact, Student's t-test, and chi-square tests. **Results:** From March to June 2005, we enrolled 282 patients with these characteristics: CHF 180 (63.8%), COPD 102 (36.2%), mean age 73.7 years, male 53.9%, adverse outcome 59.2% (admitted 48.6%, BiPAP 2.8%, intubated 1.8%, MI 3.9%, relapsed 15.6%, deceased 7.8%). Table 1 compares patients with and without adverse outcomes. **Conclusions:** We found a very high rate of adverse outcomes and significant differences between patients with and without adverse outcomes. These data suggest that there is good potential for development of clinical decision rules and provide important feasibility information. **Key words:** airways, congestive heart failure, chronic obstructive pulmonary disease, clinical decision rules

**Table 1, Abstract 282.**

| Characteristic | Patients with adverse outcomes | Patients with good outcomes | $p$ value |
|---|---|---|---|
| Dyspnea duration | 5.8 d | 8.5 d | 0.13 |
| Nursing home | 10% | 3% | 0.04 |
| Heart rate | 98 bpm | 91 bpm | 0.03 |
| Respiratory rate | 26/min | 21/min | <0.01 |
| SaO2 room air | 91% | 95% | <0.01 |
| PO2 | 87 mm Hg | 67 mm Hg | 0.02 |
| Blood glucose | 8.6 mMol/L | 7.6 mMol/L | <0.01 |
| Creatinine | 149 µMol/L | 119 µMol/L | 0.02 |
| TnT | 0.14 µg/L | 0.01 µg/L | <0.01 |

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**Intubating conditions and hemodynamic effects of etomidate for rapid sequence intubation in the emergency department: an observational cohort study.**

Zed PJ, Abu-Laban RB, Harrison DW. CSU Pharmaceutical Sciences and Department of Emergency Medicine, Vancouver General Hospital; Faculty of Pharmaceutical Sciences and Faculty of Medicine, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** To evaluate intubating conditions and hemodynamic effects of etomidate in patients undergoing rapid sequence intubation (RSI) in the emergency department (ED). **Methods:** We conducted a prospective, observational study of patients who received etomidate for induction for RSI over a 42-month period in a tertiary care teaching hospital. Intubating conditions were determined for both sedation/paralysis and for technical difficulty using a 5-pont Likert scale. Hemodynamic effects were evaluated pre, post and every 5 minutes for 15 minutes following administration of etomidate. Hemodynamic effects were evaluated using repeated measures analyses of covariance. **Results:** 522 patients were included in the final analysis. Lidocaine and fentanyl were used as pretreatment in 65.1% and 26.1% of patients respectively, while succinylcholine was the paralytic in 94.3% of intubations. Sedation/paralysis were rated as excellent or good in 88.1% and 8.9% of patients respectively, while technical difficulty was very easy or easy in 60.7% and 19.0% of patients, respectively. Baseline systolic and diastolic blood pressure (SBP/DBP) and heart rate (HR) ± SD were found to be 132.7 ± 35.4 mmHg, 69.5 ± 21.2 mm Hg and 96.1 ± 26.2 beats/min, respectively. Overall, there was a clinically insignificant elevation in SBP ($p$ < 0.0001), DBP ($p$ = 0.0002) and HR ($p$ < 0.0001) immediately post-intubation. Elevations in SBP persisted at 5 minutes ($p$ = 0.0230) and 10 minutes ($p$ = 0.0254) post-intubation while DBP and HR returned to and remained at baseline 5 minutes post-intubation. In the subgroup of 80 patients with a pre-intubation SBP <100 mm Hg, there was a 12.1 mm Hg elevation in SBP ($p$ < 0.0001) and a 7.3 mm Hg elevation in DBP ($p$ = 0.0001) immediately post-intubation which persisted throughout the 15-minute post-intubation assessment period. **Conclusion:** Etomidate appears to provide appropriate intubating conditions and hemodynamic stability in a heterogeneous group of patients undergoing RSI in the ED even in patients with low-pre-RSI blood pressure. **Key words:** airway, rapid sequence intubation, etomidate

**284**

**Use of lidocaine and fentanyl premedication for neuroprotective rapid sequence intubation in the emergency department.**

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**Introduction:** Autoregulation is dysfunctional in the injured brain, and as such increases in intracranial and arterial pressure may re-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

sult in extension of the primary injury. Rapid sequence intubation (RSI), is a well known to cause surges in both arterial pressure and intracranial pressure (ICP). Neuroprotective agents, namely lidocaine and fentanyl, have the potential to minimize the pressure surges implicated in secondary brain injury. The purpose of this study was to determine the frequency with which neuroprotective agents were used for neuroprotective RSI in the ED. **Methods:** We conducted a retrospective chart review of all 139 patients intubated in the VGH ED between Mar–Oct 2003. Patients were eligible if there was an indications for neuroprotective agents defined as presumed intracranial pathology and MAP >85 mm Hg. Contraindications to fentanyl included MAP <85 mm Hg or allergy to fentanyl. Data are reported using standard descriptive statistics. The primary outcomes for this study are reported as proportions presented using percentages with 95% confidence intervals (CI). **Results:** 77 patients were included in the final analysis. Indication for intubation included non-traumatic causes ($n$ = 37), including cerebrovascular accident or intracranial hemorrhage and closed head injury ($n$ = 40). The mean age (± SD) was 52.3 ± 20.4 years and 31.4% were female. 74% of patients had indications for neuroprotective agents, without contraindication. When neuroprotective agents were indicated, lidocaine and fentanyl were used in 84.2% (95% CI 72.6–91.5%) and 33.3% (95% CI 22.4–46.3%), respectively. 11% of the intubations were performed with a fentanyl dose of >2 µg/kg, which is the lower limit considered effective. **Conclusions:** Despite the potential benefit of using lidocaine and fentanyl in appropriate patients undergoing neuroprotective RSI in the ED, our study identified a significant underutilization of optimal premedication. Identification of barriers to use and implementation of strategies to optimize use are necessary. **Key words:** airway, rapid sequence intubation, lidocaine, fentanyl

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**Post intubation hypotension: incidence, risk factors and outcomes.**

Edwards JP, Green RS. Department of Emergency Medicine, Dalhousie University, Halifax, NS, *Canada*

**Introduction:** Post intubation hypotension (PIH)is a potentially life threatening adverse event. The objectives of this study were to determine the incidence, risk factors, impact on length of stay (LOS), and mortality associated with PIH after emergency department (ED) intubation. **Methods:** A structured chart audit was performed for patients over 16 years of age requiring emergent endotracheal intubation (EETI) in a single tertiary care ED between March 1, 2004 and July 1, 2005. Data collected included admission diagnosis, medications (outpatient and those used during ETI), comorbidities, vital signs, in-hospital length of stay, and mortality. PIH was defined as a decrease in systolic blood pressure (SBP) to <90 mmHg, a decrease in SBP of 20% from baseline, or a decrease in mean arterial pressure (MAP) to <60 mm Hg in the 2 hours following EETI. In patients with pre-intubation hypotension (SBP <100 mm Hg in the hour before EETI), PIH was defined as a further decrease in SBP of 5 mmHg or more. **Results:** Overall, 218 patients intubated in the ED were identified. The incidence of PIH of 64.3% and resulted in a 9.5 day prolongation in the median length of stay for those who developed PIH than for those who did not (24.1 vs. 14.6). PIH was not associated with an increase in in-hospital mortality. Risk factors for development of PIH included COPD (23.3% of those with PIH vs. 4.0%, $p$ = 0.0003), outpatient calcium channel blockers (12.8% in PIH vs. 2.7%, $p$ = 0.0161), angiotensin receptor blockers (10.4% vs. 2.7%, $p$ = 0.0434), or bronchodilators (12.8% vs 4.1%, $p$ = 0.0416). In addition, the use of vasopressors during ETI was associated with PIH (33.8% in PIH vs. 8.1%, $p$ < 0.0001). **Conclusions:** PIH is a common adverse event after EETI and is associated with a prolonged length of stay. Outpatient medications and the need for vasopressors during EETI are associated with PIH. **Key words:** airway, intubation, hypotension

**286**

**A comparison of the bougie with a rigid fiberoptic scope: Does the Levitan FPS Scope® perform better than the bougie in a simulated difficult airway?**

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**Introduction:** In this study we compared the use of a relatively new intubating stylet (FPS Levitan®fiberscope) with the bougie in a simulated difficult airway setting. **Methods:** A total of 103 participants were recruited for our study. Our study population included paramedics, respiratory therapists, medical residents, and medical students. Participants were excluded from the study if they had prior experience with the fiberscope. Following a 20 minute video participants practiced with feedback during 6 intubations with each tool. Following this, participants were required to attempt intubation using both instruments on two manikins with differing but fixed laryngoscopic views where only the epiglottis is seen (Cormack and Lehane grades 3A and 3B). Our two primary outcome measures were total intubation time and success rate. **Results:** Intubation on the 3A airway was successful 103 times (100%) using the bougie and 98 times (95%) using the fiberscope. The difference between these outcomes was not statistically significant. Intubation of the 3B airway was successful only 9 times (9%) using the bougie and 101 times (98%) using the fibersope. This difference was statistically significant ($p$ > 0.0001). The mean time to intubation of the 3A airway was 31 seconds for both methods. The mean times to intubation of the 3B airway were 114 and 33 seconds for the bougie and the fiberscope respectively. Eight participants required two attempts at intubating the 3A airway using the fibersope while only one participant required two attempts to intubate the 3A manikin using the bougie. Eleven participants required two attempts to intubate the 3B manikin with the fibersope. **Conclusions:** We conclude that the Levitan stylet fiberscope used as an adjunct to direct laryngoscopy performed as well or better than the bougie in simulated difficult airways. **Key words:** airway, intubation, bougie, fiberscope

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**Severe hypotension following endotracheal intubation.**

Edwards JP, Green RS. Department of Emergency Medicine, Dalhousie University, Halifax, NS, *Canada*

**Introduction:** Post intubation hypotension (PIH) is common after emergent endotracheal intubation (EETI). Little data is available on the effects of severe post intubation hypotension (SPIH) after EETI. The objective of this study is to identify the risk factors, the impact on the length of stay (LOS) and the mortality associated with SPIH compared to those who develop less severe PIH. **Methods:** A structured chart audit was performed for patients over 16 years requiring emergent intubation in a single tertiary care referral center between March 1, 2004 and July 1, 2005. Data collected included admission diagnosis, medications (outpatient and those used during ETI), comorbidities, vital signs, in-hospital length of stay, and mortality. SPIH was defined as as an absolute decrease in SBP to <80 mm Hg or a decrease in mean arterial pressure (MAP) of 60 mm Hg occurring in the 2 hrs after ETI. **Results:** The incidence of SPIH was 14.0% in 218 patients who required EETI, as compared to 64.3% incidence of less severe hypotension. The median length of stay in hospital was 7.6 days longer for those who developed SPIH than for those who developed less severe hypotension (9.0 vs. 16.5 days).

SPIH was not associated with in hospital mortality. Patients with SPIH also underwent more invasive procedures ($p = 0.003$). Risk factors for SPIH included age over 70 years ($p = 0.0003$), pre-incident beta blocker use ($p = 0.040$), and administration of nitrates ($p = 0.0176$), vasopressors ($p < 0.0001$) or neuromuscular blocking agents ($p = 0.010$) during EETI. A diagnosis of pneumonia was also associated with SPIH ($p = 0.0142$). **Conclusions:** SPIH is a common complication of ETI with a significant impact on length of stay in hospital and the need for invasive procedures when compared to patients with less severe PIH. **Key words:** airway, intubation, hypotension

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**Prospective multicenter trial of an action plan following emergency department discharge for acute asthma.**

Rowe BH, Ross S, Blitz S, Craig W. Department of Emergency Medicine, University of Alberta, Edmonton, Alta., *Canada*

**Introduction:** Action plans (AP) are effective in the management of chronic asthma; however, few asthma patients presenting to the ED employ these strategies. Our objective was to examine the effectiveness of an AP strategy in the ED for patients discharged home after treatment for acute asthma. **Methods:** 3 Canadian EDs enrolled patients (pts); enrolled pts underwent a structured ED interview and telephone interview 3 and 6 weeks later. Inclusion criteria were MD diagnosis of asthma, age 8–55, and discharged from the ED. Pts were randomized to AP or asthma education (AE) using concealed allocation. AP pts received a standard paper-based AP, paper-based education, and encouragement to return to their primary care provider (PCP); AE pts received paper-based education materials only. PCP follow-ups, AP review with PCP, and use of inhaled corticosteroids (ICS) 4 weeks after ED discharge were recorded. Data analysis used Chi-2, t-test, K–W test. **Results:** Of 104 pts, 53 (51%) were assigned to AP and 51 (49%) were assigned to standard AE. Age (21 years), sex (55% female), smoking status (9% current smokers), previous admissions (60%), and prior use of (ICS (66%) were similar for both groups. The groups differed on ED beta agonist treatment (AE = 100%, AP = 92%, $p = 0.05$). At discharge, all pts received oral corticosteroids and a similar proportion of new or existing ICS prescriptions were documented (87% vs 96%). At final follow up, the AP group had fewer follow-ups with their PCP (45% vs 68%, $p = 0.02$); however, 67% of the AP group had discussed their action plans with their PCP at their visit. Similar proportions were still taking ICS (79% vs 81%). **Conclusions:** Despite universal access to health care, this sample of discharged asthmatics did not take advantage of care opportunities despite encouragement and provision of AP in the ED. Future research might target other education interventions, such as web-based tools or in-ED AE, to improve follow-up in this high-risk group. **Key words:** airway, asthma, action plans

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**Prospective multicenter study of admissions to Canadian hospitals for acute asthma.**

Rowe BH, Blitz S, Tyler L, Stiell I, Young B, Stenstrom R, Campbell S, Abu-Laban R. Department of Emergency Medicine, University of Alberta, Edmonton, Alta., *Canada*

**Introduction:** Hospitalization after ED treatment of acute asthma varies across jurisdictions, and limited previous research has involved health systems with universal access and high use of preventive medications. Our objective was to determine the factors associated with hospitalization after ED treatment for asthma in Canada. **Methods:** 16 Canadian EDs enrolled patients (pts) over the study period. Enrolled pts underwent a structured ED interview and telephone interview 2 weeks later. Inclusion criteria were MD diagnosis of asthma, age 18–55, and no evidence of COPD. Admission was defined as an acute visit that resulted in a formal admission to that hospital. Data were analyzed using Chi-2, t-test, K–W test, and logistic regression. **Results:** Of 694 subjects, 91 (13%) were admitted to the hospital; site admission proportions ranged from 0–38%. Pts who were admitted differed from those discharged in age (36 vs 31 years, $p < 0.001$) but not gender (65% vs 63% females). There was no difference in the number of ED visits in the previous 2 years between admitted and discharged pts. Those already receiving oral (20% vs 8%; $p < 0.001$) or inhaled (75% vs 65%; $p = 0.08$) corticosteroids (CS) were more often admitted. Treatments in the ED differed based on admission status; admitted pts more frequently received systemic CS (34% vs 7%; $p < 0.001$) or MgSO4 (22% vs 2%; $p < 0.001$). Similar proportions received beta-agonists (69% vs 68%) and/or ipratropium bromide (62% vs 60%) within 1 hour. LOS for admitted patients varied (median: 3 days; IQR: 2, 5). Significant predictors of admission in multivariate testing were age (OR = 1.6/10 years; 95% CI: 1.3–2.0) and already receiving oral CS (OR = 2.4; 95% CI: 1.3–4.4). **Conclusions:** Admission to Canadian hospitals for acute asthma from the ED varies; however, is lower than other studies. Those already treated for their exacerbation with oral CS were more likely to be admitted. Further efforts to reduce admissions seem warranted. **Key words:** airway, asthma

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**Prospective multicenter study of treatment and relapse following emergency department discharge for acute asthma.**

Rowe BH, Mackey D, Tyler L, Blitz S, Lang E, Walker A, Ross S, Sivilotti M, Borgundvaag B. Department of Emergency Medicine, University of Alberta, Edmonton, Alta., *Canada*

**Introduction:** Risk of relapse after ED treatment of asthma exacerbations is uncertain, and previous North American research has included limited data from Canada. Our objective was to determine the treatment and relapse rate after ED treatment for asthma. **Methods:** 16 Canadian EDs enrolled patients (pts) over the study period. Enrolled pts underwent a structured ED interview and telephone interview 2 weeks later. Inclusion criteria were MD diagnosis of asthma, age 18–55, and discharge to home. Relapse was defined as an urgent visit to any ED or clinic within 2 weeks of ED discharge; pts lost to follow-up were counted as non-relapses. Data were analyzed using Chi-2, t-test, K–W test, and logistic regression. **Results:** Of 694 pts, 603 (87%) were discharged from the ED; follow-up was available in 527 (87%). Most patients were discharged on oral (79%) and inhaled (88%) corticosteroids (CS); self-reported compliance rates were 92% and 84%, respectively. Relapse was 9% at 1 week, and 13% (95% CI: 10%–16%) at 2 weeks. Females were more likely to relapse than males (16% vs 8%, $p = 0.01$) as were pts receiving oral CS (18% vs 7%, $p < 0.001$) and/or inhaled CS (78% vs 63%, $p = 0.01$) at the initial presentation. More pts who relapsed had at least one ED or urgent clinic visits for acute asthma during the past 2 years (71% vs 53%, $p = 0.004$). Relapse pts were more likely to report at least 2 days of activity limitations before the ED visit (69% vs 56%, $p = 0.03$). Relapse was not associated with any initial vital signs nor discharge medications. Controlling for age (OR = 1.2/10 years; 95%CI: 0.9–1.5) and female sex (OR = 1.8; 95% CI: 1.0–3.2), prior ED or urgent clinic visits (OR = 2.0; 95% CI: 1.2–3.4), and already receiving oral CS (OR = 2.3; 95% CI: 1.2–4.6) were associated with relapse. **Conclusions:** Overall, demographics (age and sex), past asthma control (number of ED visits) and recent treatments (especially oral CS) were associated with asthma relapse. Future research is required to target this high-risk group. **Key words:** airways, asthma, corticosteroids



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

# BIOETHICS TRACK

**297**

**Northern Ontario attitudes toward the practice of invasive procedures on the newly dead.**

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**Introduction:** Newly dead patients have long been used to practice invasive procedures (IP). Canadian patients have not been surveyed regarding this practice. We surveyed a Northern Ontario population regarding their attitudes toward the practice of IP on the newly dead. **Methods:** An anonymous, written, bilingual survey was conducted on a convenience sample of patients, friends, and relatives in the Sudbury ED waiting room in March–April 2005. Respondent demographics were queried. A hypothetical scenario was described. Respondents were asked: (1) if consent from the closest friend or relative (CFR) is needed to practice IP on the newly dead; (2) if they would agree to have IP of varying invasiveness performed on themselves or a friend/relative; (3) if they were comfortable with their CFR making this decision for them. Responses were on a 5-point Likert scale. Descriptive statistics and the chi square test for trend were used. Research ethics committee approval was obtained. **Results:** There were 148 completed surveys (mean age: 39; 64% female). One hundred eleven (75.0%) agreed that consent should be obtained. As the CFR of the deceased, respondents would provide consent as follows: cardiac ultrasound, 82.4%; intubation, 75.7%; central line insertion, 75.0%; pericardiocentesis, 72.3%; thoracostomy, 71.6%; thoracotomy, 52.7%. As the deceased, respondents would be willing to have IP practicsed on them as follows: cardiac ultrasound, 85.1%; intubation, 81.1%; central line insertion, 79.7%; pericardiocentesis, 75.7%; thoracostomy, 73.0%; thoracotomy, 57.4%. A favourable response correlated with decreasing invasiveness ($p < 0.05$). One hundred twenty-two respondents (82.4%) were comfortable with their CFR making this decision for them. **Conclusions:** The majority of this Northern Ontario population: (1) believes consent is required; (2) would give consent to an IP being performed on a deceased friend/relative; (3) is willing to have an IP practiced on them if deceased; (4) is comfortable with their CFR making this decision for them. **Key words:** bioethics, newly dead patients, invasive procedures

# DIAGNOSTIC IMAGING

**299**

**Discrepant interpetation of emergency department radiographs: early experience with using PACS.**

Eisenhauer MA, Hames H, Ouellette D. Division of Emergency Medicine, University of Western Ontario, London, Ont., *Canada*

**Introduction:** The use of a new electronic X-Ray tracking system was evaluated 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:** Retrospective cohort study of discordant radiographs in the first month of utilization of PACS (Picture Archiving and Communication System). Radiographic reports were classified as: normal, abnormal but clinically insignificant or abnormal and clinically significant. Abnormal reports were compared to the interpretation by the EP, and all discrepant cases were reviewed. The clinical record was reviewed to determine the Emergency Department management, and the type of follow-up. Total numbers of discrepant reports, time to dictation/transcription of reports, and compliance with use of the electronic system were also determined. **Results:** A total of 486 consecutive plain film radiology reports were reviewed. Of these, 153 (31.5%) were classified as abnormal and clinically significant. The EP interpretation was either discrepant or not documented in 54 (35%) of these 153 abnormal cases. Of the 54 discrepant cases, 40 (74%) had proper follow-up, either by telephone after discharge, or by referral to the appropriate service. The remaining 14 (26%) discrepant cases did not receive any documented follow-up. Average time to dictation by radiology was 1.5 days (range 0–35), and average time for the report to be transcribed was 5.6 days (range 0–39). **Conclusions:** In this study the majority (74%) of plain film discrepant reports were managed appropriately, however appropriate follow up was not achieved in 14 cases (26%) during the first month of use of the PACS system. Although this is a small subset of the total number of films ordered ($n = 486$), improvements need to be made in the electronic charting and identification of discrepant reports to optimize patient care and outcomes. **Key words:** diagnostic imaging, information technology

**302**

**Comparison of CT head interpretation between emergency physicians and neuroradiologists.**

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**Introduction:** Cranial computed tomography (CT) is widely used in ED 24 hours a day with radiologist interpretation often not immediately available. We compared the accuracy of CT head interpretation between the staff emergency physicians (EP) and neuroradiologists (NR). **Methods:** We conducted a health records review of patients who required head CT in the ED of a tertiary care hospital. We included the first 110 adult patients for five consecutive months and excluded patients who did not have EP interpretation, whose charts were missing or cases of stroke code or trauma code. We reviewed all cranial CT images and reports, the ED charts, and categorized findings as normal, insignificant, or clinically significant findings. We prepared descriptive and kappa statistics with 95% CIs. **Results:** Of 548 CT head cases reviewed, 442 were eligible for this study. The mean age was 57.9 years; females were 56.0%. Indications for CT: head injury 31.0%, TIA/CVA 21.9%, acute headache17.7%. CTs were reported as: normal or non-acute 81.5%, insignificant 3.8%, and significant 14.7% with the most common abnormal findings subdural hemorrhage (SDH) 15 cases, intracerebral hemorrhage (ICH) 14 cases, acute/subacute infarction 13 cases, and mass lesion 8 cases. The agreement between EP and NR was: all cases 92.8%, normal 95.4%, insignificant 63.6%, and significant 82.5%. The weighted Kappa for agreement was 0.83 (95% CI 0.76–0.90). Among disagreements, these were judged clinically unimportant for 6.6% and important for 0.7%. 3 important cases missed were 1) traumatic intraventricular hemorrhage without hydrocephalus, 2) 9mm SDH deemed non-surgical, and 3) brain atrophy which mis-read as posterior fossa SDH. 82.8% of patients with unimportant findings had appropriate follow-up arranged. **Conclusion:** Clinically important findings on CT head are not commonly missed by EPs and patients rarely have inappropriate disposition. EPs in our study can competently interpret cranial CT with very good agreement with NRs. **Key words:** diagnostic imaging, computed tomography, diagnosis, accuracy

**305**

**Diagnostic accuracy of shunt series and CT in the initial evaluation of ventricular shunt malfunction in children presenting to the emergency department.**

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Pediatric Emergency Medicine, University of Ottawa, Children's Hospital of Eastern Ontario, Ottawa, Ont., *Canada*

**Introduction:** Cerebro-spinal fluid shunting malfunction might result in surgical revision of the shunt. Since clinical signs and symptoms in the emergency department (ED) are only partially contributory to the diagnosis of obstruction, imaging such as shunt-series (SS) and CT scan are important. The aim of this study was to determine sensitivity, specificity, positive and negative predictive values of both diagnostic procedures for patients who present to the pediatric-ED. **Methods:** Retrospectively, charts were reviewed on all patients with a shunting device that presented to a tertiary pediatric-ED and had a SS over a two year period. A pediatric neuroradiologist, blinded to previous radiological readings, reviewed all SS and CT scans, and was able to compare them to earlier films. Data collected included demographic information and medical history, and whether revision was performed. Sensitivity, specificity, positive, and negative predictive values were calculated. **Results:** A total of 335 visits were reviewed. 34 (10%) SS were read as abnormal. CT was done in 290 (87%) of the visits. Of the visits with CTs, 68 (23%) had findings suggestive of shunt malfunction. In 22 (8%) hydrocephalus was found but no previous CT scans were available and 104 (36%) had hydrocephalus unchanged from previous CT. Both were excluded from the diagnostic ability analysis. Nine had abnormal findings on SS but not on the CT, but only one needed revision. In total, a third of all visits (101, 30%) ended in a shunt revision. Sensitivity, specificity and positive and negative predictive values of SS for the need of revision procedure were 25%, 96%, 78% and 74% respectively and of CT scan were 85%, 72%, 82%, and 77% respectively. **Conclusions:** Diagnostic imaging has a limited accuracy in identification of children who need shunt revision. Shunt series has very modest contribution and prospective studies should evaluate the cost-effectiveness of SS in children. All previous CT scans should be reviewed and compared with the scan at presentations to the ED. **Key words:** diagnostic imaging, computed tomography, diagnosis, cerebro-spinal fluid shunt

**306**

**The need for CT scans in patients under 50 years of age presenting with symptoms of renal colic.**

Epstein NL, Chin S, Pereira M. Emergency Departmentt, Credit Valley Hospital, University of Toronto, Toronto, Ont., *Canada*

**Introduction:** Given the expense and high radiation of CT scans together with renal colic largely being a benign albeit painful disease, this study looked at the evidence to support a subgroup of patients who may forego a CT scan. **Methods:** We conducted a chart reviews of 796 patients from a large community hospital over a 2 year period. The study consisted of patients between 18–50 years of age who visited the ER with a diagnosis of renal colic. Patients over 50 were excluded as most ER doctors would see a CT scan as imperative in this age group to rule out serious diagnoses like a ruptured AAA. The data looked at the number of patients requiring intervention and whether return visits to ER resulted in intervention. Comparisons were made with respect to the amount of analgesic to determine any pattern for intervention. Finally, the data was assessed for any deleterious outcomes. **Results:** 93% of patients had CT scans done. 86.5% of patients passed their stone without intervention. 13.5% required an intervention which was either lithotripsy, cystoscopy, retrieval of stones, stents and percutaneous nephrostomy. Return visits to the ER for the intervention group was 62% suggesting unremitting pain. There was no significant difference in the mean dosage of morphine between the intervention group and non-intervention group – 14.79 mg vs. 11.79 mg. There was no appreciable difference in mean morphine dose when comparing size of stone – 12.16 mg for stones greater than 5 mm and 10.42 mg for stones less than 3 mm. Virtually all patients received a dose of indomethacin. None of these patients in this study had an adverse outcome. **Conclusions:** It may be reasonable on the first visit to forego a CT scan in a young healthy patient where there is a high degree of certainty of the diagnosis and whose pain resolves quickly with small doses of anlagesics. The amount of morphine administered did not prove to be a marker for those who would require an intervention. However, return visits to the ER may be a precursor for future intervention. **Key words:** diagnostic imaging, computed tomography, renal colic

**307**

**Length of stay considerations when selecting an imaging strategy for high-risk patients with suspected pulmonary embolism: an analysis of the pulmonary embolism diagnostic study.**

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**Introduction:** The Pulmonary Embolism Diagnosis Study (PEDS) is the largest randomized trial to compare computerized tomographic pulmonary angiography (CTPA) to ventilation-perfusion lung scanning (VQ) as the initial imaging strategy in patients with suspected pulmonary embolism (PE). While the PEDS trial revealed equivalence in terms of the 3-month rates of symptomatic VTE, this analysis seeks to determine which imaging strategy is most advantageous to a busy ED by reducing index visit length of stay (LOS) and admission rates (AR). **Methods:** PEDS was a prospective, randomized double blind trial (clinicians, outcome adjudicators) with concealed allocation. Eligible patients from our ED setting were "high-risk" by either a "likely" pre-test probability (Wells) or a positive d-Dimer and underwent randomization to either VQ followed by bilateral compression ultrasonography (CUS) in the event of indeterminate (non-high, non-normal) results or CTPA followed by CUS for all negative studies. Data on time intervals, LOS and AR from all relevant ED visits was retrieved through our center's administrative databases. **Results:** 238 patients were randomized at our center; 118 to VQ scan and 120 to CTPA. Baseline characteristics were similar in regards to age, sex, presenting complaint, co-morbidities, d-Dimer result and pre-test probability of PE. The mean ED LOS in the VQ group was 19.2 hours versus 23.5 with CTPA (Difference = 4.8 hours; 95% CI 0.65 – 7.95) in CTPA. This difference in LOS favoring VQ was equally distributed between delays from presentation to thoracic imaging (VQ or CTPA) and delays from thoracic imaging to disposition. A higher admission rate was noted in the CTPA arm than the VQ strategy (26.9% vs. 15.7%; difference 11.2%; 95% CI 0.9–21.5%). **Conclusions:** In our center, a VQ initiated imaging strategy is a more efficient means of investigating suspected PE by virtue of a reduced ED LOS. Differences in the rate of admission warrant further analysis. **Key words:** diagnostic imaging, computed tomography, pulmonary embolism, ventilation-perfusion scanning, length of stay

**308**

**How valid is the concept of clinically unimportant lesions on computed tomography for minor head injury patients?**

Clement C, Stiell IG, Rowe BH, Schull M, Brison R, Lee JS, Leclair C, Wells GA. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:**The Canadian CT Head Rule (CCHR) was developed to help physicians predict which minor head injury patients have im-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

portant brain injury (IBI) on CT. This sub-study evaluated the clinical validity of the concept 'clinically unimportant brain injury' (CUBI) as previously endorsed by academic neurosurgeons. **Methods:** The prospective cohort study enrolled adults with loss of consciousness, amnesia, or confusion and GCS 13–15 at 10 teaching EDs. Data included MD dataforms, neuroradiologist CT reviews, hospital records, and 14-day follow-up. Patients were considered to have CUBI, hence requiring neither admission nor specialized follow-up, if neurologically intact with one of these CT lesions: solitary contusion <5 mm in diameter, localized subarachnoid blood <1 mm thick, smear subdural hematoma <4 mm, or closed depressed skull fracture not through inner table. We compared groups by chi-square and t-test analyses. **Results:** From 5,828 study patients, 685 (11.8%) had acute lesions on CT: 496 (72.4%) IBI and 189 (27.6%) CUBI cases. CUBI patients were younger (37.2 vs 46.8 years), had fewer skull fractures (13% vs 43%), had fewer admissions (63% vs 94%), were more likely to return to normal activities at 14 days (44% vs 19%), underwent no craniotomies (0% vs 9%) or other interventions (0% vs 8%), and had no deaths (0% vs 2%). The 2 groups had these CT findings and CCHR performance (Table 1):

**Table 1, Abstract 308.**

| CT finding | CUBI, % | IBI, % |
|---|---|---|
| Epidural hem | 0 | 12 |
| Intravent hem | 0 | 10 |
| Intracereb hem | 0 | 5 |
| Cerebral edema | 0 | 3 |
| Contusion | 43 | 61 |
| Subarachnoid | 43 | 47 |
| Subdural hem | 15 | 35 |
| Depressed # | 2 | 6 |
| CCHR criteria | | |
| High risk | 55 | 83 |
| Medium risk | 29 | 14 |
| Low risk | 15 | 0 |

**Conclusions:** Minor head injury patients with CUBI had no severe CT lesions, fewer admissions and follow-up problems, no neurological interventions, and no head injury deaths. This study validates the CUBI concept and further confirms the accuracy of CCHR for IBI cases. **Key words:** diagnostic imaging, computed tomography, head injury, brain injury, decision rule

**309**

**An international survey of emergency physicians' knowledge, use, and attitudes toward the Canadian C-spine rule.**

Eagles D, Stiell IG, Clement C, Brehaut J, Kelly AM, Mason S, Kellermann A, Perry J. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** The derivation and validation of the Canadian C-Spine Rule (CCR) has been published in emergency medicine and general medical journals. Little, however, is known of its international diffusion and use. The purpose of this study was to determine the knowledge, attitudes and behaviour of emergency physicians (EPs) in Australasia, Canada, the UK and US regarding the CCR. **Methods:** A prospectively conducted self-administered email and postal survey was sent to members of 4 national EP associations using a modified Dillman technique. Random samples of members from ACEM (Australasia), CAEP (Canada), BAEM (UK) and ACEP (US) were sent a prenotification letter followed by at least 4 mailouts. Awareness, use and attitudes regarding the CCR were analyzed using descriptive and univariate statistics with 95% CIs. **Results:** Overall, 1043 (35.1%) responses were received. Physician demographics included: 74% male, mean age of 46 years and mean of 16 years' experience (see Table 1).

**Table 1, Abstract 309**

| | Australasia | Canada | UK | US | *p* value |
|---|---|---|---|---|---|
| Response rate, % | 53 | 57 | 12 | 41 | |
| Aware of CCR, % | 66 | 98 | 91 | 94 | <0.0001 |
| Use CCR always/ most of time | 36 | 74 | 63 | 47 | <0.0001 |
| CCR is useful in my practice | 66 | 83 | 83 | 77 | <0.0001 |
| Patients benefit from use | 70 | 80 | 73 | 67 | <0.0001 |
| Improves use of resources | 66 | 81 | 69 | 75 | <0.0001 |
| Using another rule or strategy | 52 | 20 | 29 | 51 | <0.0001 |

**Conclusions:** There is a very high level of knowledge of the CCR in all study countries except Australasia. The CCR was viewed favourably across multiple measured dimensions. Usage, however, varied significantly by country with Australasian EPs reporting the least use. A better understanding of the factors related to increased use of decision rules will facilitate strategies to enhance derivation, dissemination and implementation of future rules. **Key words:** diagnostic imaging, computed tomography, decision rule, C-spine injury

**310**

**Physician attitudes toward a clinical decision for subarachnoid hemorrhage in acute headache patients: an international survey.**

Perry JJ, Stiell IG, Clement C, Eagles D, Brehault J, Kellerman A, Mason S, Kelly AM. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** It is often recommended that patients with acute headache undergo computed tomography (CT) followed by lumbar puncture (LP) to rule out subarachnoid hemorrhage (SAH). Our objective was to determine current practice and physician attitudes towards investigating acute headache patients. **Methods:** We surveyed 1772 emergency physicians from 3 countries (USA, Canada, Australia) by taking a random sample of members of their respective emergency physician associations (ACEP, CAEP, ACEM). We used a modified Dillman technique with 3–5 notifications plus pre-notification letter using a combination of e-mail and/or letter mail. Physicians were asked a series of questions about neurologically intact patients with acute headache (peaking within one hour of onset). Analysis included appropriate descriptive statistics. **Results:** Of physicians surveyed, 996 (56%) responded: USA 41%, Canada 57%, Australia 53%. The mean physician age was 42.5 years (range: 28–85) with 76.5% male. 50% of physicians replied that all such patients should be investigated with CT (USA 58%, Canada 45%, Australia 49%). 56% of respondents felt CT should be always be followed by lumbar puncture (USA 52%, Canada 58%, Australia 55%). In their current practice, 61% stated they either always, or most of the time order a CT followed by LP (USA 60%, Canada 58%, Australia 63%). 96% reported that they would use a clinical decision rule for neurologically normal acute headache patients to rule out SAH: 98% USA, 97% Canada, 94% Australia. The median required sensitivity of a rule was 99%, which was uniform for all three countries. **Conclusion:** This large international survey determined that



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

current practice differs from the recommendations of texts and authorities on SAH and shows wide variations of practice patterns. Substantial support exists for a clinical decision rule for headache patients. The required sensitivity of a rule was realistic with few physicians requiring 100% sensitivity to be deemed acceptable. **Key words:** diagnostic imaging, computed tomography, subarachnoid hemorrhage, headache, decision rule

## EMS TRACK

### 311

**Canadian emergency medical services airway survey, 2005.**

Vu EN, Vu MP, Wong D. Division of Emergency Medicine, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** The provision of basic-to-advanced prehospital airway management is variable across the country. Emergency medical services (EMS) do not necessarily share data relating to protocols and standards. The Canadian EMS Airway Survey was designed to survey 11 of Canada's largest EMS providers and report on the airway skills and pharmacology being used at Basic Life Support (BLS) and Advanced Life Support (ALS) levels. **Methods:** Institutional research ethics board approval was obtained. A web search was performed to identify a convenience sample of 11 of Canada's largest EMS systems that provide BLS and ALS services. Each service was asked to characterize the proportion of paramedics trained to each level and the distribution of the levels of training on ground and air ambulances. **Results:** BLS crews have similar airway management skill sets across the country and none supplement their protocols with pharmacological adjuncts. A single BLS group uses the combitube. Though all services surveyed have ALS trained personnel, the relative proportion of ambulances staffed with these capabilities ranges from 1%–99%. While ground ALS crews have similar skill sets across the country, their pharmacological armamentarium have greater variation. The majority of air medical services use muscle relaxants for airway management. The staffing and levels of training varies the most for air medical crews in the services surveyed. **Conclusions:** We have described how 11 of Canada's largest EMS services train and staff their ground and air ambulances and what skill sets and pharmacological adjuncts are used for airway management at the BLS and ALS levels. BLS airway management is consistent across the nation. There is variation in both the provisions of ground ALS services and the pharmacology being used despite a relatively consistent skill set at this level. Our results are limited as this was a convenience sample of 11 services and thus may not be representative of all EMS services across the nation. **Key words:** EMS, airway

### 312

**Does the prehospital Glasgow Coma Scale score reliably reflect anatomical brain injury in major trauma patients?**

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**Introduction:** The prehospital Glasgow Coma Scale (GCS) score is used by paramedics to make management decisions, such as intubation, for major trauma patients. We sought to correlate the initial GCS score with the presence of anatomical brain injury in prehospital trauma patients. **Methods:** This prospective cohort study was conducted as a substudy of the Major Trauma component of the Ontario Prehospital Advanced Life Support (OPALS) Study: a controlled clinical trial conducted in 17 cities and which enrolled all adult major trauma (Injury Severity Score [ISS] >12) patients during BLS and subsequent ALS phases. Data were abstracted from the Ontario Trauma Registry, then ambulance, centralized dispatch and ED records. In this study, we compared the prehospital GCS score to the Abbreviated Injury Score for Head and Neck (AIS-HN). We conducted univariate analyses as appropriate for the data. **Results:** The 2,867 patients enrolled were mean age 46.1 (range 16–98), male 71.8%, injury type (blunt 91.4%, penetrating 5.9%, burn 2.6%); median ISS 22 (IQR:17–29); survival 81.1%. Comparing patients with valid prehospital GCS scores, those <9 ($n$ = 495) to those ≥9 ($n$ = 1,619) for AIS-HN (Table 1):

**Table 1, Abstract 312.**

| AIS–HN | GCS <9, % | GCS ≥9, % |
|---|---|---|
| 0 – None | 11 | 41 |
| 1 – Minor | 1 | 0 |
| 2 – Moderate | 3 | 16 |
| 3 – Serious | 12 | 12 |
| 4 – Severe | 19 | 19 |
| 5 – Critical | 52 | 12 |
| 6 – Maximum | 2 | 0 |

Among GCS <9 patients with AIS-HN 0–2, mean scene systolic blood pressure was 57.5 mm, intubation attempts 48.6%, mean ISS 33.3, mortality 48.6%. Among patients with GCS >9 and AIS-HN 3–6, mean ISS was 23.8 and mortality 12.8%. **Conclusions:** A surprising number of patients with prehospital GCS <9 do not have serious head injury but do have very high morbidity and mortality. A significant number of GCS ≥9 patients have serious-critical head injury. In major trauma, prehospital GCS does not reliably predict the presence of anatomical head injury but is strongly associated with morbidity and mortality. **Key words:** EMS, Glasgow Coma Scale, brain injury

### 316

**Arrival in the emergency department by ambulance for headache; a marker of high risk for subarachnoid hemorrhage.**

Perry JJ, Stiell IG, Wells GA, Mortensen M, Sivilotti M, Bullard M, Symington C, Lesiuk H, Lee JS, Eisenhauer M, Wiesenfeld L, Caytak J. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** There is currently little emphasis on the mode of arrival of emergency department (ED) headache patients with regard to risk of non-traumatic subarachnoid hemorrhage (SAH). This study assessed the use of ambulance for acute headache patients for the outcome of SAH. **Methods:** This prospective cohort study was a sub-study of a large multi-center study to derive a clinical decision rule for SAH. Six university tertiary care EDs in 5 medium to large cities participated in this study. Consecutive adult patients with an acute headache, without neurological deficit were enrolled. Analysis included descriptive statistics with appropriate univariate analysis and odds ratios (OR) with 95% confidence intervals (CI) for arrival by ambulance and referral from rural ED for the outcome of SAH. **Results:** There were 3051 enrolled patients with mean age 43.5 years (SD 17.4), 60.2% female, and 157 (5.2%) SAH cases. Overall, 629 (20.6%) of the patients arrived by ambulance and 8.8% were referrals. Of patients who arrived by ambulance, 91 (14.5%) had SAH. Univariate chi-squared analysis found that arriving by ambulance was highly significant for SAH ($p$ < 0.001), OR 6.0 (95% CI: 4.3–8.4). This compares with the OR 2.5 (95% CI: 1.7–3.9) for pa-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

tients referred from other EDs. Excluding patients referred from other EDs, did not alter the OR for arrival by ambulance (OR = 6.3, 95% CI: 4.4–9.1). **Conclusion:** This was the first prospective study to determine the relationship between arrival by ambulance and subarachnoid hemorrhage in neurologically intact headache patients. This study demonstrates that patients or their relatives are more likely to request an ambulance based on the seriousness of the condition. Physicians should consider mode of arrival as part of the diagnostic assessment of acute headache patients. **Key words:** EMS, headache, subarachnoid hemorrhage

**317**

**Effectiveness of dispatch-assisted CPR instructions: successes and challenges.**

Verma A, Vaillancourt C, Trickett J, Crete D, Beaudoin T, Nesbitt L, Stiell IG. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** We sought to determine the frequency of agonal breathing during cardiac arrest (CA), its impact on the ability of 9-1-1 dispatchers to recognize CA, and the impact of dispatch-assisted CPR instructions on bystander CPR rates. **Methods:** We conducted a before–after trial enrolling out-of-hospital cardiac arrest adult patients for which resuscitation was attempted in a single city, with a BLS-D/ ALS tiered EMS service. We measured victim, caller, and system characteristics during two successive 9-month periods before and after the introduction of dispatch-assisted CPR instructions. Trained reviewers used a standardized data collection form when listening to 9-1-1 tapes. We report descriptive and absolute risk statistics with 95% CI. **Results:** There were 529 cardiac arrests between July 1st, 2003 and December 31st, 2004. Victim characteristics were similar in the before ($n$ = 295) and after ($n$ = 234) phase: mean age 68.3, male 66.7%, witnessed 50.1%, call to vehicle stop 6:37 min:sec, VF/VT 34.2%, and survival 4.0%. We located 82.1% of 9-1-1 tapes for the after period. Callers were female 63.5%, victim's spouses 29.2%, and previously trained 24.0%. Dispatchers recognized 56.0% (95% CI 48.9–63.0%) of cardiac arrest cases; agonal breathing was present in 37.0% (95% CI 30.1–43.9%) of all cardiac arrest cases and accounted for 50.0% (95% CI 39.1–60.9%) of missed diagnosis. CPR instructions were offered to 75.2% and accepted by 53.7% of callers; 13.4% declined instructions because of prior training. 16.7% and 8.3% of callers provided ventilations and chest compressions as a result of the intervention. Delays occurred between call-to-diagnosis 2:37 min:sec, and during ventilation instructions 1:48 min:sec. Bystander CPR rates increased from 16.7% to 26.4% (AR 9.7%; 95% CI 8.3–11.1% $p$ = 0.006). **Conclusions:** Before dispatch-assisted CPR instructions, no other intervention had succeeded in improving bystander CPR rates in our community. Agonal breathing and ventilation instructions had a negative impact. **Key words:** EMS, CPR, cardiac arrest

**318**

**Effectiveness of a paramedic assistant on enrollment rates for prehospital research studies.**

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**Introduction:** Patient enrollment by paramedics in prehospital studies is often lower than expected, for a variety of reasons. We sought to determine the impact of a paramedic research assistant on the enrollment rate in the Canadian C-Spine Rule (CCR) Prehospital Validation Study. **Methods:** We conducted a before–after trial comparing two enrollment strategies for the CCR Prehospital Validation Study by Ottawa BLS and ALS paramedics. Paramedics were asked to voluntarily follow the Canadian C-Spine rule, while continuing to immobilize all trauma patients according to their pre-existing protocols. We compared two successive 3-month periods where a similar multi-intervention enrollment strategy was used: Before – By researchers from an independent research institute; and After – By a paramedic research assistant with direct access to paramedics. We measured patient characteristics, paramedic comfort using the rule, and enrollment rates in the CCR Prehospital Validation Study. We report descriptive and absolute risk statistics with 95%CI. **Results:** There were 686 immobilized eligible trauma cases between April 1st and September 30th, 2005. Characteristics of the enrolled cases were similar in the before ($n$ = 49) and after ($n$ = 269) phase: Mean age 42.1, male 52.0%, trauma from motor vehicle collision 52.7%, and admission to hospital 12.0%. There were 1 significant c-spine injury during the before phase, and 3 in the after phase; none were missed by the rule. ALS paramedics were present at the scene 81.3% of times; and 75.3% of BLS and ALS paramedics felt very comfortable using the rule. Recruitment rates were low during the first 3 years of the study. They increased from 18.1% (95% CI 13.5–22.7%) to 64.8% (95% CI 60.2–69.4%) as a result of the intervention; AR 46.7% $p < 0.0001$. **Conclusions:** Enrollment in the CCR Prehospital Validation Study significantly increased after we hired a paramedic research assistant. EMS researchers should consider doing the same when designing prehospital research protocols. **Key words:** EMS, patient enrollment

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**Dispatch-assisted CPR instructions in Canada: a survey of national resources.**

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**Introduction:** Although dispatch-assisted CPR instructions can improve bystander CPR and survival rates for out-of-hospital cardiac arrest victims, the best way to deliver this intervention remains unknown. We sought to determine the prevalence of dispatch-assisted CPR instructions in Canada, the type of instructions provided, and the training of the dispatchers providing these instructions. **Methods:** We conducted a national survey of all Emergency Medical Service (EMS) Health Authorities in Canada. Methodology experts developed the survey and distribution used a modified Dillman technique. Our participants provided information on their: 1) EMS organization; 2) use of dispatch-assisted CPR instructions; 3) type of instructions; and 4) dispatcher qualifications. We weighted each survey response by the population of the catchment area represented by the responding Health Authority (2004 census). We report descriptive statistics. **Results:** We surveyed 82 EMS Health Authorities from 10 Canadian provinces. Our response rate was 73.2%, representing 79.7% of the Canadian population. Respondents were EMS program managers 61.7%, with paramedic training 51.7%. Most EMS Health Authorities provide a multiple-tier cardiac arrest response 89.0% with ALS paramedics 79.5%. Dispatch-assisted CPR instructions are provided to 87.6% of Canadians by 53 EMS Health Authorities. Among those providing instructions, 76.8% use Clawson's Medical Priority Dispatching. Since January 2005, the Clawson system teaches chest compressions only CPR. The other EMS Health Authorities use a variety of locally developed or ad hoc instructions. 9-1-1 callers receive their CPR instructions from paramedics 59.2%, laymen communication officers 40.7%, or nurses 0.1%. **Conclusions:** This is the first National survey describing practices with regard to dispatch-assisted CPR instructions. This information is essential to develop clinical trials testing a variety of educational approaches and delivery methods for telephone CPR instructions. **Key words:** EMS, CPR, dispatch, cardiac arrest

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**Continuous positive airway pressure ventilation for acute respiratory failure in the prehospital setting: a randomized controlled trial.**

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**Introduction:** Numerous randomized controlled trials and meta-analyses demonstrate the benefits of continuous positive airway pressure (CPAP) ventilation over endotracheal intubation (ETI) for acute respiratory failure in the Emergency Department and Intensive Care Unit settings, but the evidence for CPAP in the prehospital setting is limited to several case series. We performed a randomized controlled trial to determine whether patients with ARF treated with CPAP in the prehospital setting had lower overall ETI rates than those treated with standard care. **Methods:** Patients presenting to paramedics with acute respiratory distress were included if they were >16 years, had a respiratory rate >25 breaths/min, hemodynamically stable, able to cooperate with ventilatory support measures, and were assessed by paramedics as being in urgent need of ETI and manual ventilation. Patients were excluded if they required ETI for airway protection, had a respiratory rate <8 breaths/min, were hemodynamically unstable, had ongoing cardiac ischemia or any chest pain within 3 hours of presentation, a valid "do not resuscitate" advanced directive, or if paramedics anticipated an inadequate supply of portable oxygen. After initial paramedic assessment, eligible patients were randomized to either usual care (including ETI) or CPAP in a blinded fashion by the paramedic dispatcher. The primary outcome measure was the need for ETI (determined by blinded chart review) from the time of accessing medical care to hospital discharge. A sample size of 65 patients was required to demonstrate a 37.5% difference in ETI rate between the treatment groups. Results were analyzed using Chi-squared analysis for the primary outcome measure. **Results:** Final data analysis had not been completed at the time of abstract submission. Full results will be presented at the conference. **Conclusions:** This is the first randomized controlled study evaluating CPAP in the prehospital setting for acute, undifferentiated respiratory failure. **Key words:** EMS, airway, continuous positive pressure ventilation, respiratory failure

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**A systematic review of pediatric prehospital care effectiveness: What evidence is provided by RCTs and quasi-RCTs?**

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**Introduction:** The practice of Emergency Medical Services for Children (EMSC) is evolving rapidly. Understanding the effectiveness of prehospital interventions is vital to providing the best, cost-effective care. Since randomized controlled trials (RCTs) remain the best study design to evaluate effectiveness while limiting bias, we aimed to systematically review all RCT and Quasi-RCT studies of EMSC effectiveness. **Methods:** We conducted a comprehensive search of published articles from 1966 to 2005 available through Medline , EMBASE, CENTRAL, and eight other electronic databases. We also hand searched key emergency medicine conference proceedings, and contacted authors of included trials. Studies were included if they: 1) were RCTs or quasi-RCTs, 2) examined any prehospital EMSC intervention, 3) reported any outcome, and 4) included children <18 years old. Two authors independently screened the abstracts and reviewed potentially relevant studies for eligibility. A descriptive analysis was performed. **Results:** The literature search yielded 11,606 articles. 327 were examined for inclusion. Two prehospital RCTs were found. One is a quasi-RCT comparing children undergoing prehospital endotracheal intubation with those receiving bag–mask ventilation (Gausche et al, 2000). No significant difference in survival or good neurologic outcome was found between groups. The other is a cluster randomized trial that randomly assigned ambulance crews to simultaneous compression-ventilation cardiopulmonary resuscitation (SC-V CPR) or conventional CPR (Krischer et al, 1989). This trial enrolled patients of all ages and described children <14 years old as a subgroup. The study revealed worsened survival to both hospital admission and to discharge for the SC-V CPR group. **Conclusions:** RCT study design is rarely used to investigate the effectiveness of prehospital interventions in children. Current policy decisions in EMSC rely on alternative sources of information that may have a higher risk of bias. **Key words:** EMS, pediatrics, systematic review, RCT

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**The impact of ambulance diversion on EMS resources.**

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**Introduction:** Ambulance diversion has been proposed as a solution to waiting room deaths and overcrowding. It remains, however, highly controversial. The impact on EMS resources is not known. This study seeks to determine how diversion impacts the availability of ambulance resources. **Methods:** All ambulance responses in 2002 while one of the city's hospitals was on diversion were collected, including those responses during the hour of the diversion and 30 minutes before and after. The time intervals for these responses were time and date matched to 2001, when no hospital was on diversion. Total out of service time, time from departure from scene to arrival at hospital, and time from arrival at hospital to availability for another call were compared using a t-test. **Results:** A small difference was found in the time from scene to hospital (10:42 control vs 11:25 min diversion, $p = 0.03$) but this is of questionable clinical significance. Otherwise the time intervals were not different. **Conclusion:** The fact that the EMS system was able to maintain response and turnaround times during a diversion shows a positive impact of diversion on the availability of EMS resources. **Key words:** EMS, diversion, resources

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**The effect of the 2000 international emergency cardiac care guidelines on the treatment provided by Canadian advanced life support EMS systems.**

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**Introduction:** Minimal research exists on the uptake of emergency cardiac care (ECC) guidelines. We sought to determine whether the 2000 International ECC Guidelines influenced treatment by Canadian advanced life support (ALS) EMS systems. **Methods:** We conducted a national survey of all 121 ALS EMS systems in Canada. To develop the survey, content experts explicitly reviewed the 2000 ECC Guidelines and established a list of drug and airway changes a priori. Outcomes measures were current and prior use of the interventions of interest, and whether the guidelines were attributed as the impetus for protocol changes. The survey was distributed in September 2005 using a modified Dillman technique. Descriptive statistics are reported. **Results:** Forty EMS systems from 9 provinces participated (33%), representing 1,616,717 annual EMS calls in a catchment of approximately 18 million persons (56% of the Canadian population). The number of systems currently using surveyed interventions were: (1) Airway: endotracheal intubation 38 (95%);



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

combitube 23 (58%); laryngeal mask airway 11 (28%); and (2) Drug: amiodarone 18 (45%); vasopressin 3 (8%). Eleven systems (29%) currently using endotracheal intubation had no advanced rescue airway available. In 22 of the 28 systems (79%) using the laryngeal mask airway and/or combitube there was no indication these were in use prior to the 2000 ECC Guidelines release, however only 8 of the 28 systems (29%) identified the 2000 ECC Guidelines as the impetus for the addition of rescue airway devices. Of the systems using amiodarone, 11 (61%) reported this was due to the 2000 ECC Guidelines. **Conclusions:** This is the first national study on the effect of the 2000 International ECC Guidelines. Our results show substantial variability across ALS EMS systems in the uptake of recommended changes. These findings are of particular relevance to knowledge translation bodies, educators, and EMS medical directors in light of the recent release of the 2005 International ECC Guidelines. **Key words:** EMS, guidelines

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**Quality assessment of the success rate of endotracheal intubations performed by advanced care paramedics in Ottawa, Canada.**

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**Introduction:** Advanced Care Paramedics (ACP) in Ontario routinely perform pre-hospital endotracheal intubation. Regular qualitative assessment of the procedure ensures the effectiveness and proficiency in an Emergency Medical Service. Current success rate in the medical literature varies in the range of 50 to 90 percent, dependent on the training and skill level of paramedics and patient population. Our study examines the success rate of our program and identifies potential barriers. **Methods:** We conducted a two years retrospective chart review of all Ambulance Call Reports (ACRs) with documented invasive airway attempts between June 2003 and July 2005. Information was extracted from ACRs by three independent extractors on all eligible charts and cross-referenced to resolve interpretation conflicts. **Results:** Of 1028 intubated patients that were reviewed, 516 (50.2%) were pronounced dead on scene; 512 (49.8%) were transported to emergency departments. Majority of the patients were adults (97.9%), with a mean age of 65.4 years (SD 18.5). Overall endotracheal intubation success rates were 82.1% (95% CI: 79.6, 84.3); first attempts: 65% (95% CI: 62.0, 67.8). Higher incidence of successful intubation occurred in VSA patients ($p < 0.001$), pre-intervention GCS = 3 ($p = 0.003$). Nature of ambulance calls was not found to be associated with greater success in intubation ($p = 0.182$). The most common reasons preventing successful intubations were the presence of foreign body or fluid in the airway (27.2%), problems with airway access (9.4%), unable to visualize vocal cords (8.5%), lack of room (6.8%) and clenched jaws/ trismus (5.1%). **Conclusions:** Our rate of success is similar to prior reported rates. Continual quality monitoring and regular training remain essential in maintaining the quality of care that paramedics provide. Recognition of key optimizing factors will improve the success of pre-hospital endotracheal intubations by ACPs. **Key words:** EMS, quality assessment, airway, endotracheal indtubation

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**Novel role and feasibility of a prehospital fibrinolytic/ PCI triage emergency health system.**

Bessonette JWS, Walker J, Cain E, Travers A, Petrie D, Ferguson J. Emergency Health Service, Halifax, NS, *Canada*

**Introduction:** There has been increasing evidence on supporting the role of prehospital care in the diagnosis and treatment of patients with ST segment elevation myocardial infarction (STEMI). This includes prehospital STEMI identification, risk stratification, reperfusion checklist, prehospital fibrinolysis, and/or triage to a centre capable of percutaneous coronary intervention (PCI). Hypothesis: To evaluate the implementation, maintenance and feasibility of a prehospital fibrinolysis program. **Methods:** Emergency Health Services Nova Scotia (EHSNS) is a single, provincial integrated system for the entire province of Nova Scotia. Unique aspects of this centre included [1] a fully structured Advanced Life Support based fibrinolysis program, [2] strong interdisciplinary collaboration between prehospital, emergency, and cardiology department stakeholders, and [3] a unique role of a Communication (COMM) centre in treatment allocation and stakeholder communication. **Results:** Between January 1st and December 31st 2004, over 100,000 calls province-wide were received at the COMM centre, with 15,976 in the region enrolling into the RCT. 10.7% of these calls were for chest pain (1,714/15,976) with 2% (35/1,714) of these cases being enrolled into the RCT trial. The paramedics successfully enrolled patients into the trial. The COMM centre successfully provided ECG transmission notification, multidisciplinary communication, reperfusion checklist review, and randomization for each of the 35 cases. Further description of the profile of all STEMI calls, randomization process/errors, implications for research/practice, and knowledge translation recommendations will be discussed. **Conclusions:** The novel and important role of advanced prehospital STEMI care has been demonstrated to be feasible and practical in a contemporary urban prehospital system. Both the paramedics and the COMM centre has been shown to be a major stakeholder in the implementation and maintenance of prehospital STEMI fibrinolysis/PCI triage systems and protocols. **Key words:** EMS, triage, acute coronary syndrome, STEMI

**331**

**A model for incorporating research into the paramedics scope of practice.**

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**Introduction:** The introduction of research into any Emergency Health Services (EMS) is difficult due the lack of infrastructure and content expertise on behalf of the prehospital crews themselves. This qualitative study summarizes the research experience and strategies used in the implementation of evidence-based medical research in a busy prehospital practice. **Methods:** Descriptive analyses of research methodologies and strategies spanning three years in a province-wide, single, integrated Canadian EMS System. **Results:** The first strategy was the creation of the EHS Research Consortium of Eastern Canada (ERCEC). This multidisciplinary group oversees the implementation and maintenance of all prehospital research activities in the province. The second research strategy has been to highlight three incremental tiers of involvement for any research project: Tier I: patient identification and transport to study hospital; Tier II: prehospital consent and randomisation of patients; and Tier III: prehospital administration of study intervention. The third strategy has been the creation of a multidisciplinary working group focused on maintaining research collaboration, interest and education. Level I of this group consists of a local paramedic student, an emergency medicine resident, and a senior clinical paramedic; and Level II includes a Principal Investigator, EMS Research Coordinator, and a variety of project specific internal/external collaborators. The fourth strategy has been consecutive annual prehospital research conferences hosted by para-

medics. The fifth strategy has been the maintenance of a 'question bank' that tracks all paramedic research questions utilizing standardized evidence-based methodology. To date over 150 (45% clinical based, 36% administrative, and 19% educational) questions have been added to the bank. **Conclusion:** These five strategies have made research feasible in the prehospital setting and made EHS capable of providing novel information relevant to the prehospital healthcare provider. **Key words:** EMS, research, evidence based medicine

**332**

**Novel role and feasibility of a communications centre in a prehospital fibrinolytic/PCI triage emergency health system.**

Travers AH, Ferguson J, MacKay D, Cain E, Petrie D, Bata I. Emergency Health Services, Department of Health, Nova Scotia EMS, Halifax, NS, *Canada*

**Introduction:** There has been increasing evidence on supporting the role of prehospital care in the diagnosis and treatment of patients with ST segment elevation myocardial infarction (STEMI). Our hypothesis was to evaluate the feasibility and role of the COMM Centre in a randomized clinical trial (RCT) evaluating advanced prehospital STEMI care in an urban Canadian city. **Methods:** Emergency Health Services Nova Scotia (EHSNS) is a single, provincial integrated system for the entire province of Nova Scotia. In one region (population 300,000) an ongoing multicentre prehospital RCT is evaluating prehospital fibrinolysis and/or triage to PCI. The COMM Centre's advanced STEMI roles includes: [1] advance notification of inhospital personnel of ECG transmission from field to local emergency department; [2] coordination of communication between field medics, emergency physician, and interventional cardiologist; and [3] review of reperfusion inclusion/exclusion criteria, and [4] randomization and allocation of study arms for both prehospital and inhospital enrollments. All cases were tracked prospectively in a Medical Priority Dispatch System database. **Results:** Between January 1st and December 31st 2004, over 100,000 calls province-wide were received at the COMM centre, with 15,976 in the region enrolling into the RCT. 10.7% of these calls were for chest pain (1,714/15,976) with 2% (35/1,714) of these cases being enrolled into the RCT trial. The COMM centre successfully provided ECG transmission notification, multidisciplinary communication, reperfusion checklist review, and randomization for each of the 35 cases. Further description of the profile of calls, randomization process/errors, implications for research/practice, and knowledge translation recommendations will be discussed. **Conclusion:** The novel and important role of the COMM centre in advanced prehospital STEMI care has been demonstrated to be feasible and practical in a contemporary urban prehospital system. **Key words:** EMS, communication centre, STEMI, acute coronary syndrome, randomized control trial

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**Public health paramedicine — the next step?**

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**Introduction:** Paramedics within Nova Scotia have proven themselves to be leaders in the delivery of paramedic health care in Canada. This has included initiatives such as a 'community based paramedic program' which has expanded the scope of practices of paramedics working in rural areas. Although not currently established, nor immediately anticipated, the concept of a proposed 'Public Health Paramedic' which could provide oversight in the design and implementation of multiple sustainable expanded scope projects warrants discussion. **Methods:** Descriptive analyses of knowledge translation from other 'Public Health' practitioners to the scope of practice of a paramedic. There are approximately 900 paramedics were registered as active healthcare providers in Nova Scotia including: Primary Care Paramedics (PCP: 55%, 495/900) ; Intermediate Care Paramedics (ICP: 26%, 234/900); Advanced Care Paramedics (ACP: 17%, 153/900); and Critical Care Paramedics (CCP: 1%, 10/900). Additional training has been supplied to approximately 3% of existing paramedics at the Community Based Paramedic level. **Results:** Currently the proposed program would consist of the following strategies with appropriate surveillance systems: [1] Targeted public AED program; [2] Reduction of injury and mortality due to falls; [2] Public early recognition of MI; [3] Reduction of injury and mortality due to MVC; [4] Paramedic health inventory program; [5] Public ECG library; [6] Development of Post Fall Assessment Protocol. The strengths, weaknesses, opportunities, and threats will be identified for the individual strategies required to implement a 'Public Health Paramedic' program. **Conclusions:** The role of the Public Health Paramedic is feasible in concept and deserves further attention and research into the requirements to implement and maintain such a position. **Key words:** EMS, public health

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**Proposal of an 'end-of-life' program in a prehospital Canadian setting.**

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**Introduction:** Management of patient with 'Do Not Resuscitate' directives or palliative care crises can be difficult for the patient, their families, and the prehospital care provider. Moreover, palliative care patients at times require items or service that because of progressive failing health are needed at off hours when other essential support services are not available. Consequently we propose a 3-part contemporary Prehospital 'End-Of-Life' (PEOL) Program in a Canadian community setting. **Methods:** Descriptive analyses of methodologies and strategies of a 3-part pilot PEOL Program in a single, integrated, homogenous, province-wide prehospital care system. **Results:** The PEOL Program proposal consists of the following three core elements. The first of these is the maintenance of a prospective Do Not Attempt Resuscitation registry logged by patients and their next-of-kin through the Medical Priority Dispatch System and Communication centre. The second element is the designation of selected rural EHS ambulance bases to house and deploy essential care items and non-traditional EHS services for those palliative at home. This would include: [i] the deployment and administration of a temporary Oxygen concentrator system, and [ii] the administration of Palliative care pharmaceutical kit. Both services would be provided until the formal hospital based palliative care services can be provided. The third element of the proposal is the prehospital administration of interim debriefing and grief counseling until more formal services are provided. The authors in the poster presentation will expand on the current status of this pilot project as well as the strategies, barriers, and recommendations to implementing such a program. **Conclusion:** A prehospital end-of-life program is a feasible, interesting, and a novel service that warrants further consideration in the optimal care of DNR and palliative care patients. **Key words:** EMS, do not resuscitate, palliative care

**335**

**Research on emergency prehospital services: tracer conditions.**

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**Introduction:** Prehospital services and organizations have to mutu-



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

ally adjust and share information to ensure the continuity and quality of provided care. In 2005, a study on prehospital services was done in the Chaudière–Appalaches region, a rural area situated in the province of Quebec, Canada. As a result of this study, technical and professional innovations will be implemented in 2006 to improve the continuity and quality of the current services in the area. Indicators are needed to assess the impact of these innovations. **Methods:** This descriptive prospective study used a sample of some 500 calls to the regional health communication centre to look at structure, process and outcomes in prehospital services (Donebedian, 1985; 1980; Spaite et al., 2001; Maio et al., 1999; Garrison et al., 2002). Data was collected from prehospital forms, medical files and various databases. Care encounters were reconstituted using the tracer conditions method; outcomes relating to the prehospital intervention and the overall episode of care were examined. Comparisons were made between the tracer conditions followed by an estimation of the possibilities and limits of each indicator with regard to the innovation's impact assessment. **Results:** Results provided a better understanding on the continuity of services and on the obstacles and strengths of the actual system. Difficulties in assessing prehospital services using indicators pertaining to the flow of information were confirmed. Data on continuity and outcomes exist but definition, accessibility and storage differ. **Conclusion:** Specific recommendations can be made for the assessment of prehospital innovations in order to pick the right indicators of outcomes. Longitudinal studies are recommended to ensure comprehensive recommendations on ways to improve the indicators available and the overall process of information transmission in prehospital services. **Key words:** EMS, quality improvement

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**A quantitative comparison of two tools used in the pre-hospital setting and one in-hospital setting to determine patient's potential for stroke bypass protocol and treatment with thrombolytics.**

Bayfield-Ash N, Dionne R, MacQuarrie A, Murdock M, Simard J. Ottawa Base Hospital Program, Ottawa, Ont., *Canada*

**Introduction:** Advanced and Primary Care Paramedics (ACP and PCP) in Ontario currently apply a provincial tool to determine patient eligibility for Stroke Bypass and ultimately, for thrombolysis. In Phase I this study examines the provincial tool and a previously developed local tool in terms of their application, identifying the strengths and weaknesses of both. Phase II of this study utilized the same group of patients, examining which patients subsequently met the criteria for thrombolytic therapy using an in-hospital tool and how many patients were deemed ineligible. The study provides recommendations for modifications to the existing tools that would assist the paramedics in identifying acute stroke patients with a higher degree of accuracy. **Methods:** Using a retrospective chart review, we assessed all patients arriving by ambulance (Ottawa Paramedic Service), to the single tertiary teaching hospital in Ottawa. These charts were assessed using the two tools, to determine the accuracy of the tools and any differences in patient identification. For patients meeting bypass criteria, the study identified those who were subsequently thrombolyzed and the differences between the pre-hospital and in-hospital tools. Each tool was assessed over a seven-month period between October 2004 and November 2005. **Results:** A total of 511 patient charts were identified and reviewed. Regardless of the tool utilized, less than 17% of these patients received thrombolysis (numbers and accuracy are pending full result analysis). **Conclusion:** Modifications could be made to either tool to enhance pre-hospital accuracy, and to reduce the incidence of false positive stroke codes called in the emergency department. **Key words:** EMS, stroke, thrombolysis, triage

# PATIENT SAFETY TRACK

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**Drug-related hospitalization to a large tertiary care hospital: a prospective study.**

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**Introduction:** Several studies have estimated the incidence of drug-related hospitalization (DRH); however, few data are available for the DRH rate and characterization in Canada. Our objective was to determine the frequency, severity, preventability and classification of DRH to a large tertiary care Canadian hospital, and to evaluate patient, prescriber, drug and system factors associated with these events. **Methods:** Consecutive adult patients admitted to an internal medicine service were prospectively enrolled during a 12-week period. Hospitalization was defined as drug-related if it was directly-related to one of the eight classes defined by Hepler and Strand. The primary outcomes were reported as proportions presented as percentages with 95% confidence intervals (CI). The secondary analysis of factors associated with DRH was performed by fitting a multivariate logistic regression model. **Results:** 565 patients were enrolled with a mean age of 69.3 ± 18.8 years of which 50% were female. DRH was found to be 24.1% (95% CI 20.6–27.8%) of which 72.1% (95% CI 63.7–79.4%) were deemed preventable. Severity was classified as mild, moderate, severe or fatal in 8.1% (95% CI 4.1–14.0%), 83.8% (95% CI 76.5–89.6%), 7.4% (95% CI 3.6–13.1%) and 0.7% (95% CI 0.0–4.0%), respectively. Adverse drug reactions 35.3% (95% CI 27.3–43.9%), wrong/suboptimal drug 17.6% (95% CI 11.6–25.1%) and non-compliance 16.2% (95% CI 10.4–23.5%) were the most common classes of DRH. The most common drug classes associated with DRH included cardiovascular agents 27.5%, antibiotics 23.4%, non-steroidal anti-inflammatory drugs 13.2%, central nervous system agents 7.8%, anticoagulants 5.4% and hypoglycemic agents 4.8%. Multivariate logistic regression modeling failed to identify any independent risk factors associated with DRH. **Conclusions:** Approximately one-quarter of patients in our study were admitted for a drug-related cause and over 70% were deemed preventable. Drug-related hospitalization is a significant problem that merits further research and intervention. **Key words:** drug related hospitalization (DRH); characterization of DRH.

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**Prescription completeness and errors in the resuscitation room of a pediatric emergency department.**

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**Introduction:** Our objective was to evaluate the impact of a designated prescription form on completeness of medications and intravenous fluids orders, and on prescription errors in the resuscitation room of a pediatric emergency department. **Methods:** Retrospective chart review of patients admitted to the resuscitation room of a pediatric tertiary care hospital in March, May, and July 2003 and one year later in 2004 after implementing usage of a designated prescription form in March 2004. The completeness criteria were based on recommendations from the Institute for Safe Medication Practice and are rules in our hospital. The errors and severity were classified according to the definitions of the

American Society of Hospitals Pharmacists. **Results:** Reviewing the 6 months period, 243 patients aged 7.1 (median 6) had 719 prescriptions: median 3 prescriptions/patient (range 1 to 20). The most frequent diagnoses were: trauma ($n$ = 79), difficulty breathing ($n$ = 57), neurological emergencies ($n$ = 52), and poisoning ($n$ = 16). There was no difference in the characteristics of the patients between the pre- and the post-implementation period. In the three months studied in 2003, only 14/373 (4%) prescriptions were complete and 57 (15%) errors were detected. In the three months studied in 2004, 93/346 (27%) prescriptions were complete and 23%, Δ24 (7%) errors were detected. Thus, there was an increase in completeness ( 8%, 95% CI 3, 13) after implementing aΔ95% CI 18, 28) and a decrease in error ( designated prescription form. Errors most frequently occurred at the ordering stage. Most of the errors were harmless. However, 12 errors required intervention: 2003; additional doses ($n$ = 9), assisted ventilation ($n$ = 1), and fluid resuscitation ($n$ = 1), and 2004; fluid resuscitation ($n$ = 1). **Conclusions:** A designated prescription form was associated with a significant increase in completeness and a significant decrease in error in the resuscitation room of a pediatric emergency department. **Key words:** medication errors, pediatric prescription errors, designated prescription form

**340**

**Prevalence of information gaps for seniors transferred from nursing homes to the emergency department.**

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**Introduction:** Information gaps – previously collected information that is not available to the treating physician – have implications for patient safety and system efficiency. We sought to study clinically important information gaps and the effect of a regionally standardized transfer form when the elderly are sent from nursing homes (NH) or seniors residences (SR) to the emergency department (ED). **Methods:** This health records review included a consecutive sample of patients 60 years or older transferred by ambulance from multiple NH and SR to a tertiary care ED over 6 months. Two trained observers reviewed original transfer and ED records using a structured data collection tool. Outcome measures were gaps in key indicators, gaps in descriptive detail and effect of a transfer form. We used appropriate univariate statistics. **Results:** There were 457 consecutive transfers of 384 patients; mean age 83.9 years; 70.5% female; NH 84.9%; SR 15.1%; dementia 34.1%; mean CTAS score 3.0; admitted 29.8%. Presenting complaints were trauma 21%, general/weakness 19.7%, respiratory 17.5%, GI 17.5%, neurological 14.7%. Important information gaps occurred in 85.5% (95% CI 82–88%) of cases including: Reason for transfer 12.9%; Advanced Directives 56.4%; Activity Daily Living 52.9%; Mobility 47.7%; Vital Signs 37.6%; Baseline Cognition 36.5%. Important descriptors (e.g. duration, severity, location) were frequently absent: >40% for general weakness, chest pain, abdominal pain; >80% for head injury, tetanus status. There was considerable variation amongst individual NH and SR in information gaps: Vital Signs (8.7–30.8%), Cognition (37.5–62.5%), Activity Daily Living (6.2–97.6%). A Standardized Transfer Form was used in 42.7% of transfers, and gaps occurred less often with than without the form (74.9% vs 93.5%; $p <$ 0.0001). **Conclusions:** Important information gaps very frequently exist in transfers of the elderly to the ED despite the use of a Standardized Transfer Form. Future research should focus on educational and regulatory interventions for NH and SR transfers. **Key words:** Elderly; information gaps, transitions of care; standardized transfer form

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**Prescription errors in the emergency department: a troubling reality.**

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**Introduction:** Medication errors have been shown to occur frequently in hospitals with an estimated range of 10–61%. Their causes are multiple since the process of information transmission is complex and prone to errors. The incidence of prescription errors in the ED is unknown. **Methods:** The charts of 50 consecutive patients were retrospectively reviewed. To assess error frequency, we compared the list of drugs identified by the triage nurse and the initial prescription of the emergency physician (EP) to a pharmacist's medication history, this being our gold standard. An error was defined as a discrepancy between the triage note or the written prescription of the EP and the list of drugs established by the pharmacist, excluding drugs stopped for medical reasons. Errors were classified according to the National Coordinating Council for Medication Error Reporting and Prevention. **Results:** 27 of the charts were for females and 23 males. In 20 charts (40%), the triage list differed from the patient's medication. For physician prescription, the number of files with errors was 22 (44%). Of the 28 "error free" charts, 16 had benefited from a pharmacist's intervention. In 41 patients, a total of 154 errors were found; errors of omission being the most frequent (49%). Two errors required the hospitalization of the patients involved. The foremost classes of drugs associated with error were CNS (benzodiazepiness, antidepressants, and others) followed by cardiovascular (ACE inhibitors, nitrates and others), gastrointestinal, hormonal, and so on. **Conclusion:** Medication errors in our ED occurred frequently. In order to prevent them, we need to raise public and community pharmacists' awareness and insist on an updated medication list. Furthermore, the possible role of an emergency pharmacist should be explored to gather a complete medication history thereby ameliorating medication errors. **Key words:** ED medication errors; pharmacist ED involvement; ED medication adverse events

# Wednesday, June 7th: CAEP Poster Presentations

# CARDIOVASCULAR TRACK

**348**

**Body surface potential napping of ventricular fibrillation in human subjects.**

Fitz-Clarke JR, Sapp JL, Clements JC, Horacek BM. Department of Emergency Medicine, Dalhousie University, Halifax, NS, *Canada*

**Introduction:** Electrocardiogram signals obtained during ventricular fibrillation (VF) are complex, and therefore potentially rich in information. It might be possible to tailor resuscitative decisions according to inferred status of the myocardium. Attempts have been made over the years to quantify and characterize various features of VF signals, such as dominant frequencies, fractal dimensions, and scaling exponents obtained in single leads. Few attempts have been made to examine spatial features in multiple leads. We report on the first high-resolution body surface potential maps (BSPM) of VF recorded and analyzed in humans. **Methods:** A 120-lead ECG mapping system was used to record the spatiotemporal dynamics of potentials over the torso surface of 6 human subjects undergoing controlled testing of implantable defibrillators. VF was induced by burst pacing, and subsequent electrical activity was obtained for 6 to 8



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

seconds before the device delivered a rescue shock. **Results:** Maps reveal highly dynamic single and multiple spatial regions of positive and negative potentials that move rapidly over the body surface. Offline processing of maps allows characterization of complexity in terms of the number of equivalent dipoles, dominant frequency maps, wavelet transforms, and cross-correlations between leads. Results are interpreted with the aid of a large-scale detailed three-dimensional computer model of VF developed in our lab. **Conclusions:** Spatial signals add a new dimension to VF analysis. Preliminary results are establishing a novel quantitative foundation for defining VF complexity. Feature extraction may be possible with a smaller set of leads. **Key words:** ventricular fibrillation, mapping

**349**

**Clinical outcomes and patient satisfaction of an emergency department-based outpatient deep vein thrombosis treatment program: 6-year results.**

Zed PJ. CSU Pharmaceutical Sciences and Department of Emergency Medicine, Vancouver General Hospital; Faculty of Pharmaceutical Sciences and Faculty of Medicine, University of British, Vancouver, BC, *Canada*

**Introduction:** The purpose of this study was to evaluate the efficacy, safety and patient satisfaction of an emergency department-based outpatient deep vein thrombosis (DVT) treatment program. **Methods:** A prospective cohort study was performed in patients enrolled in the VGH outpatient DVT treatment program over a 6-year period, between June 1, 1999 and May 31, 2005. Efficacy outcomes included recurrent venous thrombolembolic (VTE) events at 3- and 6-months following discharge from the program. Safety evaluation included minor and major bleeding complications as well as the development of thrombocytopenia during the acute phase of therapy. Patient satisfaction was assessed using an 18-question patient satisfaction survey which was mailed to all patients following discharge from the program. Standard descriptive statistics were generated and binomial 95% confidence intervals (CI) for proportions were calculated. **Results:** 240 patients were included in the study with a mean age (± SD) of 54.7 ± 18.2 years of which 45% were female. The mean (± SD) duration of treatment in the outpatient program was 5.7 ± 1.2 days. Of the 207 evaluable patients, 1 (0.5%, 95% CI 0.1–2.6%) patient experienced a recurrent VTE at 3 months while at 6 months 4 (1.9%, 95% CI 0.8–4.9%) patients had recurrence. No patient experienced a major bleeding complication or thrombocytopenia while 7 (2.9%, 95% CI 1.4–5.9%) patients experienced a minor bleeding complication. Overall, 97.3% of patients were comfortable having their condition treated as an outpatient while 85.9% felt it was more convenient to return to hospital daily for medications and assessment than to be admitted to hospital. Overall, 98.4% of respondents were very satisfied/satisfied with the treatment received in the outpatient program and 95.1% would enroll again if future treatment was indicated. **Conclusion:** An emergency department-based outpatient DVT treatment program is safe, effective and is able to achieve a high level of patient satisfaction. **Key words:** deep venous thrombosis, outpatient treatment

**350**

**The 3-minute walk test: an investigation into its use as a novel clinical decision tool for patients with congestive heart failure, chronic obstructive pulmonary disease, or stable chest pain.**

Pan A, Stiell IG, Clement C, Acheson J, Aaron S. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** On a daily basis, emergency department (ED) physicians face decisions of whether to admit patients with congestive heart failure (CHF), chronic obstructive pulmonary disease (COPD), or stable chest pain. This study evaluated the feasibility of the 3-minute walk test (3MWT) as a clinical decision tool for these conditions and correlated its performance with adverse outcomes. **Methods:** In this prospective cohort study, we enrolled a convenience sample of 40 adult patients who presented to a tertiary care ED with CHF, COPD, or stable chest pain and who were being considered for discharge. Patients walked at their own pace on home O2 level or room air, and their dyspnea (measured on the modified Borg scale), respiratory rate, heart rate, and oxygen saturation were recorded each minute for 4 min (3 min of walking followed by 1 min of rest). Analyses included Fisher's exact, Student's t-test, and mixed repeated measures general linear model. **Results:** The study sample had these characteristics: CHF 40.0%, COPD 22.5%, stable chest pain 37.5%, mean age 69.0 years, male 60.0%, and test completion rate 85.0%. Twelve patients had one or more adverse outcomes (admitted 15.0%, myocardial infarction 2.5%, relapsed 15.0%, deceased 2.5%). Of those with adverse outcomes, 41.7% failed to complete the test compared to only 3.6% of those with good outcomes ($p$ = 0.01). Furthermore, in all four measurements, those with adverse outcomes performed worse than those with good outcomes, and significant differences were seen in dyspnea ($p$ = 0.04) and respiratory rate ($p$ = 0.03) measurements. **Conclusions:** The data indicate an association between patients who had an adverse outcome and those who were unable to complete the test. The 3MWT is a non-resource-intensive and practical procedure, requiring no specialized resources, training, or equipment. Hence, it can be performed in any ED to aid with discharge decisions. Further multicentre research is required to formulate guidelines and validate trends. **Key words:** clinical decision tool, cardiovascular, prognosis

**351**

**Emergency department use of intravenous procainamide for patients with paroxysmal atrial fibrillation.**

Clement C, Stiell IG, Symington C, Dickinson G. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** There is no consensus for the optimal strategy for ED management of paroxysmal atrial fibrillation (PAF). Our objective was to examine the efficacy and safety of intravenous (IV) procainamide for PAF. **Methods:** This health records review included consecutive visits over a 6-year period to a university hospital ED for adults presenting with acute-onset PAF and who received IV procainamide. Patients were identified from the National Ambulatory Care Reporting System (NACRS) database. IV procainamide was administered as an infusion of 1 gram over 60 minutes. Data were extracted from the original clinical records by a trained observer. Outcome measurements included conversion, adverse events, and relapse. We conducted descriptive analyses with 95% CIs. **Results:** Characteristics of the 433 visits from January 1 2000 to June 30 2005 were: mean age 65.5 years (range 19–92); male 50.8%; first visit 47.3%; previous PAF 86.2%; previous IV procainamide 49.4%; presenting complaint palpitations 79.7%; mean heart rate 112.1 (range 51–200); received IV rate control prior to IV procainamide 38.3%. The successful conversion rate with IV procainamide was 59.6% (95% CI 55–64%), the mean dose given 865.3 mg (range 250–1600 mg), and the median time to conversion 55 minutes. Adverse events occurred in 39 (9.0%) cases: hypotension 7.9%; bradycardia 0.5%; AV block 0.2%; ventricular tachycardia 0.2%; Torsades des Pointes 0%; myocardial infarction 0%; congestive heart failure 0%; none required admission due to reaction to IV procainamide. 83.6% of all remaining cases were converted electrically by the ED physician for an overall conversion rate of 93.3%. 97.0% of patients were discharged home from the ED but 10.2% of patients returned to the ED with PAF within seven days. **Conclusions:** This is the largest reported study of ED PAF patients treated with IV pro-

cainamide and demonstrates that this treatment is both safe and effective. IV procainamide should be prospectively compared to other ED strategies. **Key words:** atrial fibrillation, procainamide

**354**

**Development and validation of a simple prediction rule to exclude pulmonary embolism.**

Rodger MA, Raymond F, Nair R, Bredeson C, Jones G, Rasuli P, Makropoulos D, Wells P, Stiell IG. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** Safe and rapid bedside exclusion of pulmonary embolism (PE) could improve access to diagnostic imaging and save healthcare resources. We sought to develop a simple and applicable clinical prediction rule (CPR) to safely exclude PE. **Methods:** Predictor variables were collected prospectively in consecutive patients referred for V/Q scan to rule out PE. Statistically significant variables were identified by univariate analysis (Phase I). The inter-observer reliability for each significant variable was prospectively measured in an independent cohort of suspected PE patients (Phase II). Significant predictors demonstrating good inter-observer reliability were used to derive CPRs using multivariate analysis (Phase III). The CPR demonstrating the best sensitivity and specificity was then validated retrospectively (Phase IV) using the PLUSPENS study dataset (Wells et al., Ann Int Med Dec 1998). **Results:** In Phase I ($n$ = 260), 22 predictor variables were found to be significantly different ($p < 0.20$) for patients with PE compared to those without disease. In Phase II ($n$ = 60), 13/22 variables demonstrated good inter-observer reliability (kappa >0.50). In Phase III, a simple CPR was derived which excluded 26.1% of patients with suspected PE with 100% sensitivity (95% CI 91.6–100%), and 100% NPV (95% CI 91.4–100%). The CPR excluded PE if all of the following predictors were absent: 1) a positive D-dimer, 2) heart rate >110, 3) leg pain or swelling, 4) previous PE or DVT, 5) recent surgery. In Phase IV ($n$ = 1239), the clinical decision rule demonstrated a sensitivity of 95.3% (95% CI 91.7–97.8%), a NPV of 97.8% (95% CI 96.0–99.0%) and safely excluded PE in 35% of suspected PE patients. **Conclusions:** This simple and easily applicable clinical prediction rule safely excludes PE in 35% of suspected patients. **Key words:** pulmonary embolism, clinical prediction rule

**357**

**Determinant of cardiac arrest survival in a single urban/rural EMS system: an eight year study.**

Cain EJ, Karim SA. Emergency Health Services, Halifax, NS, *Canada*

**Introduction:** Our purpose was to evaluate the determinants of out of hospital cardiac arrest survival in a large single EMS system, that includes rural and urban areas. Several studies of urban EMS systems have identified bystander CPR and early defibrillation as the major determinants of survival from cardiac arrest. (need to put in references here) We sought to validate these findings in a large EMS system that uses a single set of medical protocols and responds to cardiac arrests in urban and rural areas. **Methods:** Demographic, clinical and response characteristics for patients who survived to hospital discharge were compared to those of non-survivors by means of chi2 and t test statistics. Multivariate stepwise logistic regression analysis was performed to assess the predictors of survival. Odds ratios and 95% confidence intervals were calculated for factors independently that were associated with survival to hospital discharge. **Results:** All data will be reported using the Utstein style of reporting and definitions. Over the study period, the total number of sudden out of hospital sudden deaths, confirmed cardiac arrests with resuscitation attempted and the number where cardiac etiology was the cause were 8,177, 4,957 and 4,291 respectively. Demographic information on this population will be provided. Survival rates related to the clinical and response characteristics will be presented, along with the associated odds ratios and clinical significance for age, gender, witnessed arrest, bystander CPR, arrest in a public place and presenting arrhythmia will be presented. **Conclusion:** In a system that includes urban and rural areas, the major determinants of survival from cardiac arrest will be presented. **Key words:** emergency medical services, cardiac arrest, prognosis

**358**

**Emergency department physician ECG interpretation accuracy: a prospective cohort study.**

Williams DJ, Chestnut SG, Woolfrey K. Division of Emergency Medicine, McMaster University, Hamilton, Ont., *Canada*

**Introduction:** Emergency Department (ED) interpretation of 12 lead electrocardiograms (ECG) is essential for patient treatment and disposition. Studies have found a high rate of ECG misinterpretation by ED physicians, but only a small percentage of these result in adverse patient outcomes. No published data reports the accuracy of ECG interpretation in Canadian EDs. **Methods:** We prospectively evaluated the accuracy of ED ECG interpretation compared to cardiologist interpretation from March to August 2004 at St. Joseph's Healthcare in Hamilton, Canada. All ECGs performed on adult (age greater than 17) ED patients were eligible for inclusion. ED physicians recorded interpretations onto either an open-ended or closed-ended data collection form. Blinded cardiologist interpretations were abstracted from medical records. ED and cardiologist interpretations were independently compared and graded by 2 authors as: 1. Equivalent or clinically insignificant error, 2. Errors of possible clinical significance, or 3. Errors of probable clinical significance. Medical records of grade 3 cases were reviewed to determine patient outcomes. ED physician level of training and data collection form were examined as secondary outcomes. Primary outcome results are presented as frequency of error. Secondary outcomes were assessed with multivariate logistic regression, and are reported as odds ratios with 95% confidence intervals. **Results:** 709 cases were collected. 524 cases were grade 1 (73.9%), 151 cases were grade 2 (21.3%) and 34 were grade 3 (4.8%). Review of grade 3 cases found only one adverse patient outcome. Accuracy of ED interpretation correlated inversely with level of training. The odds of ED residents making grade 2 or 3 errors was significantly lower than ED staff (OR 0.63, CI 0.44–0.89, $p$ = 0.01). The closed-ended data form did not improve ED interpretation (OR 0.92, CI 0.64–1.33, $p$ = 0.67). **Conclusions:** Despite a high rate of disagreement between ED physician and cardiologist ECG interpretations, effects on patient outcome are minimal. **Key words:** ECG interpretation, outcomes

**362**

**Reperfusion time delays incurred by patients with ST-elevation myocardial infarction in Quebec hospitals: results from the AMI-Quebec registry.**

Afilalo J, Afilalo M, Tselios C, Huynh T, for the AMI-Quebec Investigators. Division of Emergency Medicine, SMBD Jewish General Hospital, McGill University, Montreal, Que., *Canada*

**Introduction:** Current guidelines emphasize timely reperfusion therapy in patients with ST-elevation myocardial infarction (STEMI). Recent studies showed that recommended reperfusion time delays are achieved in a minority of patients. There have been no studies examining reperfusion time delays in Quebec which is unique because of its large number of catheterization centers per capita and its environmental characteristics. We sought to describe the reperfusion time delays incurred by real world patients with STEMI in Quebec.



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

**Methods:** The AMI-Quebec registry was compiled via retrospective chart review of consecutive STEMI patients during 2003. Seventeen Quebec hospitals participated (10 tertiary, 7 community). We excluded patients who presented >12 hours after symptom onset and patients who did not receive reperfusion therapy. **Results:** We included 1,189 patients (mean age 61 ± 13 years, 26% females). The majority of patients presented to community hospitals (61.5%) and the remainder presented to tertiary hospitals (38.5%). The median symptom-to-door time was 95 min. The median door-to-needle time was 32 min and <30 min in 49.0% of patients. In patients who presented to tertiary hospitals with on-site percutaneous coronary intervention (PCI), the median door-to-balloon time was 110 min and <90 min in 35.7% of patients. In patients who presented to community hospitals and required transfer for PCI, the median door-to-balloon time was 141 min and <90 min in 8.0% of patients. Transfer for PCI consisted of 35 min for the ambulance to arrive at the community hospital and 40 min for the inter-hospital transport. Overall, the median symptom-to-reperfusion time was 192 min. **Conclusions:** In patients with STEMI presenting to Quebec hospitals, time delays for reperfusion are substantial. Patients who require transfer for PCI are least likely to receive timely reperfusion therapy. Measures such as streamlined STEMI protocols, prehospital fibrinolysis, and facilitated PCI should be explored to shorten reperfusion time delays. **Key words:** myocardial infarction, reperfusion therapies

**366**

**Investigation and management of patients with transient ischemic attack in a Canadian emergency department.**

Harris DR, Grafstein E, Stenstrom R, Cheung C, Innes G. Department of Emergency Medicine, University of British Columbia, Vancouver, BC, *Canada*

**Introduction:** Evidence-based management of patients with transient ischemic attack (TIA) in the emergency department (ED) is necessary in secondary prevention of stroke. We hypothesize that significant variability exists among emergency physicians (EPs) in management of ED patients with TIA. **Methods:** We undertook a retrospective study utilizing the New Emergency Resource Database (NERD), the administrative database at St. Paul's Hospital, a tertiary care, urban academic hospital in Vancouver, British Columbia. Patients with the primary discharge diagnosis of TIA using ICD-9CM codes (435.9) were analyzed, from January 2003 to December 2004. Investigations were determined from Sunrise Clinical Manager (SCM), the computerized order entry program at St. Paul's Hospital. **Results:** 149 patients were analyzed. Median age was 69 years and 58.4% were male. 93.2% had a Canadian Emergency Department Triage and Acuity Scale (CTAS) level of I–III. The three most common triage categories were: "Weakness / Query CVA Minor Deficit" (34.2%); "Weakness / CVA + Major Deficit" (12.1%), and; "Sensory Loss / Numbness" (10.7%). Of investigations ordered by EPs: 78.5% (117) had an electrocardiogram; 70.0% (104) had a computed tomography (CT) scan of the head; 14.8% (22) had a carotid doppler, and; 7.4% (11) had an echocardiogram. 37 patients (24.8%) were referred to neurology in the ED and 23 (15.4%) were admitted to hospital. Those patients discharged from the ED had a median ED length of stay (LOS) of 3.9 hours. Median ED LOS was longer in patients who had CT scan (2.7 vs. 4.3 hours, $p = 0.0004$), were referred to neurology (3.7 vs. 4.6 hours, $p = 0.03$), or were admitted (3.7 vs. 7.2 hours, $p = 0.0013$). Of patients discharged from the ED, 4 (2.7%) returned to the same institution within 30 days, 3 (2.0%) with a diagnosis of stroke. **Conclusions:** The investigation and management of patients with TIA in the ED varies widely. Research into newer diagnostic techniques, clinical care pathways, and specialized follow up clinics may show enhanced provision of care to this patient population. **Key words:** transient ischemic attack, management

# EDUCATION TRACK

**369**

**Medical simulation in allied health education.**

LeBlanc DJ. Atlantic Health Training & Simulation Centre, Halifax, NS, *Canada*

**Introduction:** Simulation-based medical education (SBME) is gaining accceptance in many areas of clinical education, offering experiential opportunities for novice clinicians learning invasive skills in a climate of decreasing clinical exposure. With increasing competition for meaningful clinical learning opportunities, many disciplines are seeking alternatives to 'patient-based' learning. One such discipline is that of Paramedicine, which has seen dramatic expansion in scope of practice in the past decade. **Methods:** This study is designed to assess the thoughts, feelings, and opinions of learners, faculty, and administrators on integrating SBME with the Critical Care Paramedic (CCP) curriculum. The 'Exploratory Phase' of the project consists of a learner and a faculty focus group. Recommendations from these sessions will determine the 'Clinical Intervention Phase', integrating SBME with the delivery of the CCP program. Simultaneously, interviews with a Clinical Department Head, a Medical Director, and an employer of CCPs will occur. The 'Information Synthesis & Reflection Phase', will reconvene the two focus groups. In the 'Results & Recommendations Phase', data will be analyzed and interpreted. **Results:** The study asks: "Can SBME be integrated with advanced clinical curricula?"; "What are the unique advantages and disadvantages of SBME over traditional approaches to clinical education?"; "Does the use of SBME affect patient safety?"; "What are the perceived opportunities and barriers for integrating SBME?"; "How does expusure to SBME affect clinical knowledge and skill acquisition?"; and "What criteria should be applied to the implementation of SBME?". **Conclusions:** The study assesses learner and faculty perceptions of the affect that SBME has on the acquisition of knowledge and skill. It also integrates the administrators' perceptions of the opportunities and barriers for integrating SBME , and recommends criteria for future programmatic integration. **Key words:** medical simulation

**370**

**Effectiveness of a novel pneumothorax skills program for EM residents.**

Yeung M, Beecker J, Lee C, Mujoomdar A, Sundaresan S, Frank J. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** While pneumothorax management is a vital skill in Emergency Medicine, there are no validated chest tube insertion teaching methods in the literature. We designed and evaluated a novel pneumothorax skills program for Emergency Medicine residents that included use of a chest tube mannequin. **Methods:** We conducted a single-site outcomes survey of EM residents participating in a novel pneumothorax skills program. The course of lectures, videotapes, demonstrations, practice using a chest tube mannequin, performance feedback and written review material focused on insertion of a chest tube, pigtail catheter and needle thoracostomy. After informed consent, participants completed a post pre-post survey of 11 questions using a 5-point framed Likert-type scale. Primary outcome measures included previous procedural experience as well as before and after comparisons of self-reported confidence and technical proficiency. Descriptive statistics compared matched before and after scores and paired comparison t-tests determined significance. **Results:** 13 residents completed the course (3 final year CCFP(EM), 10 FRCP(EM) year 1–4 residents). Overall program satisfaction was

high (mean 4.7). Residents reported moderate prior exposure to chest tubes (3.9) and limited prior exposure to pigtail catheters (2.3). Initial confidence ratings were 3.1 for chest tubes and 1.9 for pigtail catheters. Confidence increased by 1.4 ($p < 0.001$) for chest tubes and by 2.4 ($p < 0.001$) for pigtail catheters post-training. Initial self-reported technical proficiency scores were 3.2 for chest tubes and 2.1 for pigtail catheters. There were gains of 1.2 ($p < 0.001$) for chest tubes, and 2.1 ($p < 0.001$) for pigtail catheters after the program. **Conclusions:** This pneumothorax skills program appears effective in improving the confidence and technical skills of Emergency Medicine residents. Use of a simulation mannequin augments residents' opportunities to practice critical skills and may enhance patient care and safety. **Key words:** chest tube, education

**371**

**Evaluation of a new mandatory third-year clerkship in emergency medicine**

Beecker J, Yeung M, Marks M, Frank J, Lee C, Nuth J, Weitzman B. Department of Emergency Medicine, University of Ottawa, Ottawa, Ont., *Canada*

**Introduction:** Medical students at our university experienced the first year of the new mandatory Emergency Medicine Clerkship rotation in 2003. This study assesses the effectiveness of each component of the rotation in achieving preset learning objectives. **Methods:** All medical students involved in the Emergency Medicine Clerkship rotation at a tertiary care hospital between July 2003 and June 2004 were invited to complete a written survey anonymously. Students were presented with a series of paired teaching strategies and circled the more valuable learning experiences. Descriptive statistics delineated their preferences. The survey also included open-ended questions; responses were coded to identify recurrent themes. Rotation components assessed include: clinical ED shifts, Advanced Cardiac Life Support, procedural labs, casting, tutorials, preceptor-assisted learning (student presents a topic) and supervised clinical teaching sessions (protected time for 3–5 students and one clinician). **Results:** Of 125 students, 95 (76.0%) responded. 1208 paired comparisons were performed. Percentage of respondents that preferred each teaching format: 26% preferred Advanced Cardiac Life Support, 21% clinical shifts, 18% supervised clinical shifts, 5% procedural labs, 11% tutorials, and 10% preceptor-assisted learning. Major themes from students' responses to open-ended questions were that: 1) the Emergency Medicine rotation was the best in clerkship 2) a longer rotation was desired, and 3) the ED provides an outstanding venue to hone history and physical exam skills. **Conclusions:** While individual learners indicated preferences for specific rotation components, it is the overall experience with multiple learning methods that allows all students to be successful in achieving their goals. This work may serve as a template for program directors seeking to develop a similar curriculum. This study makes a compelling case for making Emergency Medicine a core element of clerkship at every medical school. **Key words:** medical students, education

**372**

**Emergency medicine residents' and physicians' attitudes towards a mentor-observer program: a novel approach to CanMEDs competencies.**

MacGougan CK, Blitz S, Bullard MJ. Department of Emergency Medicine, University of Alberta, Edmonton, Alta., *Canada*

**Introduction:** In July 2002 the University of Alberta incorporated a Mentor-Observer (MO) program into the FRCP(C) Emergency Medicine (EM) residency curriculum to promote teaching and assessment of CanMEDS roles not addressed by other means. Each resident was paired with 2 Emergency Physician staff mentors (EPs) to directly observe them on clinical shifts. A survey was developed to assess the attitudes of residents and EPs towards the MO program. **Methods:** Using Dilman's methodology, confidential mail surveys were sent to all residents and EPs who participated between 7/2003 and 7/2004. A 7 point Likert scale was used (1 = strongly disagree, 7 = strongly agree). Responses were categorized; a score of 5 or higher was considered agreement. **Results:** Surveys were returned by 18/18 residents and 25/27 EPs (93%). All residents had at least 1 MO session. Only 68% of EPs participated in a MO session. The majority of residents (78%) / EPs (73%) enjoyed the MO sessions and felt they were a valuable learning experience (78% residents / 82% EPs). 72% residents felt they are rarely observed assessing / treating patients except during MO sessions. Average EPs time commitment was 6.4hours. Financial concerns did not limit any EPs participation and only 32% felt they should be financially compensated. Both residents (72%) and EPs (58%) felt it was difficult to arrange MO sessions. 67% of residents felt that performance anxiety changed their normal behavior. Residents (83%) and EPs (82%) felt that MO sessions should be a mandatory part of the residency curriculum. 92% of EPs were willing to be mentors again. **Conclusions:** Mentor-Observer sessions were an enjoyable and valuable learning experience for both residents and EPs. EM residents are rarely directly observed on clinical shifts. Despite scheduling difficulties and performance anxiety most participants felt MO sessions should be a mandatory part of the EM curriculum. Qualitative feedback from this survey will be used to guide further revisions to the MO program. **Key words:** resident evaluation, CanMEDs

**377**

**High-fidelity in-training examinations in emergency medicine are more stressful yet are associated with improved exam performance.**

LeBlanc V, Bandiera G. Division of Emergency Medicine, University of Toronto, Toronto, Ont., *Canada*

**Introduction:** Performance of advanced cognitive skills is influenced by level of perceived stress. Residency programs vary in the fidelity and formality of their in-training examinations. Little is known about how examination conditions affect scores on in-training examinations. Objectives were o measure the stress felt by residents during high- and low-fidelity in-training examinations to determine the effect of this stress on examination performance. **Methods:** 28 visual stimuli questions were pilot tested on residents in two Royal College of Physicians and Surgeons of Canada (RCPSC) emergency medicine (EM) residency programs. Two exams matched for difficulty and length were then administered at two week intervals to residents in two additional RCPSC EM programs. One exam was administered under stress-inducing conditions (high-fidelity) and the other under low stress conditions (low-fidelity). Perceived stress was measured at baseline using the State and Trait Anxiety Index and before an after each iteration of the examination. Exams were scored by a third party blinded to the examination condition. **Results:** Residents reported higher anxiety in the high stress condition ($41.2 \pm 1.9$ vs. $36.0 \pm 2.1$). Examination scores were higher in the high stress condition ($68.3 \pm 2.3\%$ vs. $63.6 \pm 2.1\%$). Mean exam scores in each of the PGY3 through PGY5 years did not differ based on stress condition. **Conclusions:** Residents in general do perceive higher stress in high vs. low fidelity examination conditions. Junior and senior residents exhibited similar perceptions of stress. Residents appear motivated by this stress, achieving higher scores in the high-fidelity format. **Key words:** resident evaluation

**381**

**Improving corneal tissue donation rates in an academic emergency department through physician education and reinforcement.**



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

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**Introduction:** Despite increased demand for corneal donation, there is a recognized shortage of corneal donors. The purpose of this study was to determine whether a simple educational intervention and ongoing reinforcement of Emergency Physicians (EPs) could improve rates of corneal tissue retrieval in an academic emergency department (ED). **Methods:** In the pre-intervention phase, retrospective data was collected for all department deaths during the one-year period Sep. 01, 2000 to Aug. 31 2001, specifically whether donation was considered, the reasons for any exemption and whether consent was given. The intervention phase consisted of: (1) a single "grand-rounds" session on corneal donation (2) providing social workers to assist the EPs with stressed families (3) a quarterly "feedback letter" to all EPs reporting the latest approach and consent rates and encouraging EPs to request corneal donations. Data was then collected prospectively for the next year, Oct. 01, 2001 to Sept. 31, 2002. Following this, the "feedback letters" were discontinued and post-intervention data was collected prospectively for another year. **Results:** The pre-intervention rate of request was 26/91 (28.6%) with 11 (12.1%) donating. During the intervention phase, there was a significant increase in the numbers of families approached (43/72 [59.7%]) and donations (19/72 [26.4%]) This translated to absolute increases of 31.2% ($p < 0.001$, 95% CI 13.7–48.6) and 14.3% ($p < 0.05$, 95% CI 0.7–27.9) respectively. The educational intervention had a large effect size on numbers of patients asked for donation (Cohen's d = 0.65) and a moderate effect on numbers of corneas donated (Cohen's d = 0.36). However, with cessation of the reinforcement letters, rates of request (17/56 [30.4%]) and donations (6/56 [10.7%]) dropped to baseline. **Conclusions:** Our study suggests that corneal tissue donation rates can be dramatically improved with physician education and ongoing reinforcement. **Key words:** organ donation, education

**382**

**A multifaceted workshop for improving productivity and workflow efficiency skills in emergency medicine trainees.**

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**Introduction:** ED crowding is a major challenge to the practice of EM yet training in improving throughput by enhanced productivity and workflow efficiency (flow skills) is rarely taught outside of the clinical context in residency training programs. The objective of this study was to determine if a 3-hour workshop designed to improve flow skills is perceived as having a useful impact on future practice. **Methods:** A faculty led workshop was developed focusing on four key areas of ED flow skills. Specific station objectives were designed to achieve: a. more concise charting, b. enhanced communication skills (signover and interacting with consultants), c. efficient management of minor care resources and d. efficient management of stretcher area resources. Groups of 7–10 participants rotated between these 30-minute stations engaging in hands-on exercises related to each theme. Anonymous evaluations were completed by participants at the end of the workshop. Quantitative data was analyzed using descriptive statistics and qualitative feedback was summarized. **Results:** 100% of 31 participants (22 residents and 9 staff) completed the surveys. Among resident participants the mean PGY year was 2.3 (range 1–5) while mean years in practice for staff was 6.1 (range 2.5–15). Only 42% (12/31) reported that flow skills had been previously well-taught in their training or professional development. Workshop stations reported to be either helpful or definitively helpful included those related to charting (80%; 25/31), communication (84%; 26/31), minor care (80%; 25/32) and stretcher area care (97%; 30/31). Most participants 71% (22/31) reported the workshop experience overall to be definitely useful. 18 participants (58%) felt that more time was required for each station. **Conclusions:** A flow skills workshop designed to impart specific strategies for improving efficiency in the areas of communication, charting, and the utilization of minor care and stretcher area resources is perceived positively by participants. **Key words:** residency training, ED efficiency

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**A nurse training program improves the identification of potentially septic patients in the emergency department.**

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**Introduction:** The early identification and treatment of patients with severe sepsis in the emergency department (ED) improves outcomes. Nurses are the front-line workers who have first contact with septic patients, and should have an integral role in the early identification of these patients. The objective of this study was to compare the rate of correct identification of actual ED patients with potential sepsis before and after a brief education session surrounding sepsis. **Methods:** This study was conducted in an urban, tertiary care ED (65,000 visits/year). Over a 2 week period in January 2005, 15 trained triage nurses were asked to categorize consecutive ED patients as "potentially septic" or not. 2–4 weeks later, all ED nurses (including the triage nurses) underwent a 4 hour training session on sepsis and the identification of septic patients. In March 2005, the initial process of patient categorization (potentially septic or not) was repeated with the same triage nurses. Adjudication for accuracy of responses was based on 1 ICU and 2 ED physicians reviewing the medical record. "Potentially septic" was defined as 2 or more SIRS criteria (of those criteria that were identifiable at triage: temp >38 degrees C; <36 degrees C; HR >90; RR >20) and presumed/possible infection. **Results:** 15 nurses assessed a total of 272 patients preceding the education session, and 198 patients after. Sensitivity for potentially septic patients was 75% (95% CI 69.9–80.1%) before and 92.3% (95% CI 88.6–96%) after the education session. Specificity was 91.1% and 90.1%, respectively. A repeated measures non-parametric ANOVA demonstrated significant training effect ($p < 0.01$) and no significant differences between individual nurses ($p = 0.86$) **Conclusions:** A 4-hour educational session on sepsis significantly improved triage nurses sensitivity for identifying potentially septic patients. **Key words:** sepsis, triage, education

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**The British Columbia Emergency Department Physician Workforce Study: education needs assessment for British Columbia emergency physicians.**

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**Introduction:** An education needs assessment is required for appropriate planning of emergency medicine (EM) education. **Methods:** This was a cross-sectional survey in two parts: Part 1 was a telephone survey of all Emergency Department (ED) heads in ED in BC; Part 2 was a mail survey to all physicians who work in an ED in BC, either part-time or full-time. ED heads were asked about current education activities in their departments. Individual physicians were asked about their perceived needs for CPD. All mail surveys were coded and anonymous. **Results:** 87 of 101 (86.1%) ED heads completed Part 1

of the survey. 418/929 (45.0%) physicians completed Part 2. 66/87 (75.8%) of ED heads stated that their group provided most of their own education or research support. 32/87 (36.8%) received some educational support from their Health Region; 22/87 (25.3%) from a University source; 19/87 (21.8%) from their hospital. 72/87 (82.8%) felt that a University Department of Emergency Medicine would help with educational activities and support. ED heads felt that the following educational modalities would be most beneficial: speaker workshops (91%); written materials (78.1%); web-based learning (63.2%) and video conferencing (60.4%). In Part 2, 194/416 (46.5%) individual physicians expressed interest in extra EM training. 133/194 (68.5%) were interested in training of less than 2 weeks; 52/194 (26.8%) wanted extra training of 2–4 weeks duration. Physicians who were not EM-specialty trained were more likely to desire extra training (Chi-square = 59.9, $p = 0.001$). **Conclusions:** A significant proportion of physicians in BC wish to pursue further training in emergency medicine. The majority of ED leaders believed that most benefit is gained from having speaker presentations or writing material distributed although there is interest in web-based learning and video conferencing. Developers and providers of CPD need to take this information into consideration to best tailor their education activities to identified needs. **Key words:** continuing education

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**Use of an online learning environment to support best practice in rural and urban emergency departments in Nova Scotia.**

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**Introduction:** Knowledge is a critical element in the delivery of quality care in emergency departments (EDs). However, access to, and integration of, timely, relevant, and evidence-based information at the point of care is challenging for practitioners in a busy ED. The multitude of interruptions and the unpredictable nature of patient flow contribute to a less than optimal environment for learning at the point of care. As well, the volume and organization of scientific knowledge does not lend itself to just-in-time access to address practice issues that arise. Disparities are also apparent among practitioners in rural practice settings versus those in acute, tertiary care facilities. Information technology provides an alternative to the traditional face-to-face interactions ameliorating such issues as practice location, relevance, and accessibility. **Methods:** This multisite pretest/postest study involved delivery of web based learning modules over a period of 18 months to a convenience sample of emergency practitioners from 9 rural and 2 urban EDs in Nova Scotia. All content modules followed a standardized format. Exposure to module content was preceded by a pretest and followed by a posttest. **Results:** A total of 207 multidisciplinary practitioners participated in the study. An online needs assessment resulted in development of 12 content modules. Practitioners from rural centers represented over half (54%) of the total participants in the online environment. Eighty percent ($n = 166$) of participants were nurses and 14.9% ($n = 31$) were physicians. Participation rate in the modules varied with Pediatric Trauma ($n = 78$), Management of Poisons ($n = 53$), Diabetic Emergencies ($n = 38$) and Immunizations ($n = 30$) attracting the most participation. Scores from pretest/post test resulted in a significant increase ($p < 0.05$). **Conclusions:** Information technologies present additional options for rural and urban ED practitioners to access and share relevant practice knowledge at a time and pace that is convenient in their practice context. **Key words:** on-line education

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**Participation and interest in research in emergency departments (EDs) in British Columbia. The British Columbia Emergency Department Physician Workforce Survey.**

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**Introduction:** Emergency medicine (EM) research is typically carried out in large, university-affiliated teaching hospitals. Barriers to conducting EM research in other settings include perceived lack of interest as well as infrastructure issues. The BC Emergency Department Physician Workforce Survey sought to describe the amount of time emergency physicians spend engaged in teaching and research, the proportion of EDs that are involved in research and which have an interest in research. **Methods:** This was a cross-sectional survey in two parts: Part 1 was a telephone survey of all ED chiefs; Part 2 was a mail survey to all physicians who work in an ED in BC, either part-time or full-time. In Part 1, ED chiefs were asked if they currently participated in research studies and if their department would be interested in participating in research, given the opportunity. EDs were identified from the BC College of Physicians and Surgeons hospital directory. An ED was defined as any publicly-funded facility that accepts and treats patients on an emergent basis. Standard survey methodology was followed. Part 2 of the survey asked physicians how much time they spent per week involved in teaching and research. **Results:** 87/101 (86.1%) ED heads completed Part 1 of the survey. 418/929 (45.0%) physicians completed Part 2 of the survey. 21/88 (23.8%) of EDs were involved with research. 18/21 of these sites had residents versus 3/21 that did not (Chi square = 8.1; $p = 0.004$). 15 sites involved in research had >14,000 visits per year versus 6 research sites with <4,000/year (Chi square = 5.1; $p = 0.02$). 52/66 (78.8%) sites not currently involved in research were interested in becoming involved. **Conclusion:** EDs involved in research tend be larger, and are more likely to have residents. However, 78% of sites not participating in research were interested in doing do. **Key words:** research, resident education

## RURAL AND REMOTE TRACK

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**Oligoanlagesia in isolated lower limb injuries in a rural emergency department.**

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**Introduction:** Multiple studies over many years have demonstrated that pain is poorly managed in the Emergency Department (ED). This phenomenon is referred to in the medical literature as "oligoanalgesia". However, little is known if oligoanalgesia is also true in rural ED. National Research Corporation (NRC) data from 2003 for a rural hospital in southwestern Ontario showed patients were satisfied with the amount of pain medicine received in the ED. A study was designed to replicate a previous study investigating the differential use of analgesia in isolated lower limb injuries to quantify if pain is better addressed in this rural ED. **Methods:** A retrospective chart review of isolated lower extremity injuries for which xrays of the foot and/or ankle were obtained in 2003. Demographics of the ED patients with lower extremity injuries were quantified. Also, whether or not patients received analgesia in the ED, how long it took to get the medication, whetherpatients received analgesia upon discharge, what type of analgesia was provided and ir it required a prescription. **Results:** A total of 228 charts were reviewed with exclusion criteria being met in 39 of the charts. This left a total cohort of 189 charts with 35 having fractures identified (18.5%). Patients with fractures were almost four times more likely to receive analgesia in the ED (46% vs 13%). Over half the patients in both



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press

groups received analgesia upon discharge from the ED. However, 73% of the people in the fracture group received analgesia requiring a prescription versus only 46% in the non-fracture group. Narcotics were used more often in the fracture group than in the non- fracture group (26% vs 6%). **Conclusion:** Oligoanalgesia observed in urban EDs does not seem to be a big a problem in this rural ED with patients presenting with a lower limb injury requiring an xray. Further studies should be done to see if other painful conditions are addressed as well and if so why. **Key words:** rural emergency medicine, analgesia

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**Training emergency medicine doctors for rural and regional Australia: Can we learn from the Canadians?**

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**Introduction:** Like Canada, Australia has a relatively small population dispersed over an enormous area. Both countries have difficulty in recruiting health professionals to rural and regional areas. Like colleagues in other specialties, most emergency medicine specialists choose to practice in large metropolitan hospitals. Most of the presentations to emergency departments in rural and regional areas of Australia are dealt with by 'non-specialist' doctors. There is limited data on clinical outcomes in smaller emergency departments. Apart from general practice training, there is little formal training available for doctors working in these areas. There is no equivalent to the Canadian CCFP-EM qualification. **Methods:** This study reviewed advertisements for emergency medicine doctors, consulted with multiple stakeholders, and undertook a detailed survey of 230 doctors working in 57 rural and regional emergency departments across Australia. **Results:** There is no consistent approach to levels of training and education required by potential employers. There are widely differing views on how rural emergency medicine services should be organized, resourced and staffed. The rural and regional emergency medicine workforce is increasingly overseas trained and lacking in relevant postgraduate education or formal continuing medical education. Many of the respondents have significant additional clinical and administrative responsibilities besides emergency medicine. Most report multiple dissatisfactions with their current position - principal reasons being work load, working hours, staff shortages and lack of education. Many have come to their current job from a similar rural position. Most are planning to move to a different hospital or clinical area. **Conclusions:** The rural and regional workforce generally feels undervalued, under trained and lacking a career structure. There is need in Australia to offer a specific postgraduate Diploma or Certificate in Emergency Medicine aimed at doctors practicing outside major city hospitals. **Key words:** rural emergency medicine, residency training



https://doi.org/10.1017/S1481803500013713 Published online by Cambridge University Press