

CAEP/ACMU 2001 Scientific Abstracts

Disclaimer: The large number of abstracts submitted and the short time interval between submission and publication did not permit communication with authors, abstract revision or *CJEM* editorial review. The following abstracts are presented, unedited, as they were submitted to the CAEP Research Committee. Abstract authors are from the department or division of emergency medicine of their respective universities unless otherwise specified.

Oral Presentations

001 The epidemiology of emergency department presentations in Alberta.

Holroyd BR, Bullard M, Craig W, Klassen T, Johnson D, Yiannakoulis N, et al. University of Alberta, Edmonton, Alberta.

OBJECTIVES: Few places can accurately evaluate the pattern of emergency department (ED) presentations and valuable population-based administrative information is often unavailable. This study examines the epidemiology of presentations to the ED using an electronic provincial database. **METHODS:** All patients presenting to Alberta EDs were eligible for inclusion. Data were derived from the population of ED patients treated in the 17 health regions over 1 year (fiscal 98/99). Data were extracted from the Ambulatory Care Classification System (ACCS) database, a computerized database of abstracts coded similarly across all regions. Diagnostic categories were recorded using ICD-9 coding by medical record nosologists in each hospital and represented the primary physician discharge diagnostic code. Descriptive statistics and crude presentation rates are reported. **RESULTS:** During the 1 year 1,493,659 ED visits were recorded; males (52%) and females were similarly represented. Despite an aging population, patients over 60 account for only 336,365 (17%) of all ED visits. Limited seasonal variation was observed although weekly and hourly variation was marked. Of the approximately 2.3 million residents of Alberta, 687,389 (30%) make at least 1 visit to the ED annually. Multiple visits are common with more than 38,148 (6%) patients visiting EDs more than 5 times annually in this province. Left without being seen (LWBS) cases were also common (18,672 [1.3%]). The lowest ED presentation rates occurred in the 2 largest urban areas (population >500,000). Average rates are 229/1000 population (regional range: 148–526/1000). Most (1.2 million; 89%) patients are discharged from the ED. Overall, 1490 (<1%) deaths occurred in the ED setting.

CONCLUSIONS: On an annual basis, nearly one-third of Alberta citizens present to an emergency department for care; multiple visits and LWBS require further detailed evaluation. These results provide an opportunity to further characterize ED utilization and disposition to determine the role of ED in health care delivery.

Key words: emergency department, utilization

002 Development and evaluation of a chief complaint classification system for comparing emergency department clientele.

Afilalo M, Unger B, Colacone A, Lang E, Guttman A, Robitaille C, et al. McGill University, Montreal, Quebec.

OBJECTIVES: Emergency department (ED) clientele are characterized through indicators that reflect administrative interests (i.e., length of stay [LOS], hospitalization rates, and socio-demographics). These parameters are used in governmental statistics to establish performance outcomes and compare caseloads. Chief complaint (CC) or “reason for ED visit,” a parameter not currently part of governmental statistics, may also serve as an index of caseload. At present there is no standardized CC classification method that can describe clienteles across institutions. A CC classification system was developed and evaluated for describing and comparing ED clienteles. **METHODS:** A classification method for “reason for ED visit” was developed for the adult population using sources including the list of CCs from one hospital since 1993, literature reviews, and expert recommendations. The classification list consists of 143 CCs divided into 12 anatomical categories (head, eyes, ear, nose, face, etc.) and 6 other categories (stat, traumatic, behavioural/social, non-specific, body fluid, and returns). This classification system was applied in a prospective sample of patients in 6 EDs over 9 months. **RESULTS:** At least 1 CC was recorded in 2,810 of the 2,841 patients recruited (99%). Among all CCs, 96% were represented. Overall, 3 CCs accounted for 22% of total visits (chest pain 8.0%, abdominal pain 7.3%, dyspnea 6.4%). However, these 3 represented 32% of patient-hours (LOS) in the ED, with each CC contributing approximately 10% of the total. All other CCs accounted for less than 4% of total patient-hours. Inter-institution variations between ED clienteles were observed in terms of frequency of specific CCs and associated LOS. For example, for chest pain, percent total visits varied between 4.8 and 15.7 while percent patient-hours ranged from 3.6 to 20.5. **CONCLUSIONS:** The proposed CC-based classification method is comprehensive and valuable for describing heterogeneous ED clienteles. Adopting its use across Canada would permit comparisons between different EDs.

Key words: triage, presenting complaint

003 The impact of a nurse discharge coordinator on the successful discharge of elderly patients from the emergency department.

Guttman A, Guttman R, Colacone A, Robitaille C, Lang E, Rosenthal S, et al. McGill University, Montreal, Quebec.

BACKGROUND: With the aging of the Canadian population, the

elderly make up a progressively larger proportion of emergency department (ED) visits. These patients are particularly vulnerable to inadequate discharge planning after leaving the ED, thereby placing them at a greater risk for return visits. **OBJECTIVES:** To examine the impact of an ED nurse discharge coordinator on the rates of unscheduled return visits to the ED in elderly patients. **METHODS:** Patients over 75 years of age discharged from the ED of the Sir Mortimer B. Davis–Jewish General Hospital were recruited in a pre-post study design aimed at comparing return visits to any ED within 14 days after the index discharge. During the pre phase (June to December 1999), study patients ($n = 905$) received standard discharge care. Patients in the post phase (January to July 2000), ($n = 819$) received the services of a nurse discharge coordinator in the ED. The nursing intervention included patient education, coordination of appointments, telephone follow-up and access to the discharge nurse for up to 7 days post ED discharge. **RESULTS:** Preliminary results indicate that patient groups were similar with respect to sex and age, however patients in the post phase were on more medications at baseline (5 vs. 4, $p < 0.05$) and a greater proportion perceived their presenting complaint as very severe (53% vs. 45%; $p < 0.05$). Bivariate analyses show a relative risk reduction of 36%, 95% confidence interval (CI) (–7% to 62%) for unscheduled return visits the day following the index discharge, 25%, 95% CI (0% to 44%) for up to 8 days post discharge and 19%, 95% CI (–2% to 36%) for up to 14 days post discharge. **CONCLUSIONS:** The assignment of a nurse discharge coordinator, dedicated specifically to the ED, reduces the rate of unscheduled return visits to the ED.

Key words: older patients, discharge planning

004 Emergency department overcrowding in Toronto from 1991 to 2000: the effect of systematic hospital restructuring.

Schull MJ, Szalai JP, Schwartz B, Redelmeier DA. University of Toronto, Toronto, Ontario.

OBJECTIVES: To determine the impact of systematic hospital restructuring on emergency department (ED) overcrowding at hospitals in Toronto, Canada. Restructuring was characterized by acute care bed reductions and by the closure of some EDs. **METHODS:** Data on all ambulance diversions at all EDs (hospitals = 24) from 1991 to 2000 (months = 108) was obtained. Overcrowding was classified as severe (all ambulances diverted) or moderate (most ambulances diverted). For each month, the average proportion of time that EDs requested diversion of ambulances was calculated. Autoregression analyses were conducted separately for each of the 2 severity levels. Models included month, an indicator variable for period (before or after restructuring began in March 1997), and lag terms to assess seasonality. Linear trends were estimated and compared before and following restructuring. Secondary analyses were conducted with three additional variables: monthly ED patient volume, average patient age, and the proportion of females. **RESULTS:** The average ED experienced overcrowding 10% of each month at the midpoint prior to restructuring, 25% at the midpoint after restructuring, and 40% at the study's conclusion. Before restructuring, neither severe nor moderate overcrowding was increasing (slope of 0.0% per month [$p = 0.54$] and –0.04% [$p = 0.04$] respectively). Following restructuring, both severe and moderate overcrowding began increasing significantly (slope of 0.2% per month [$p < 0.0001$], and 0.5% per month respectively [$p < 0.0001$]). The rates of change were significantly different before and following restructuring for both severe ($p < 0.0001$) and moderate ($p < 0.0001$) overcrowding. No evidence of seasonality was found. Results were similar after controlling for patient volume, age and sex. **CONCLUSIONS:** A large increase in ED overcrowding occurred following sys-

tematic hospital restructuring that is not explained by changes in patient demand. More effort is needed to understand how increased overcrowding affects patient care.

Key words: overcrowding, emergency department

005 An “ultra-sensitive” version of the Canadian CT Head Rule for US physicians.

Stiell IG, Dreyer JA, Worthington JR, Greenberg GH, Clement C, Wells GA, et al, for the CCC Study Group. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: The high sensitivity and efficiency of the Canadian CT Head Rule for minor head injury patients appears to be very acceptable to Canadian and European physicians. This study attempted to derive an even more sensitive rule that might be more acceptable to US physicians. **METHODS:** This secondary data analysis was based on a prospective cohort study conducted in 10 Canadian EDs and involving adults with loss of consciousness, amnesia, or confusion and Glasgow Coma Scale (GCS) scores of 13–15. Physicians completed a 22-item data form for all patients who then underwent computed tomography (CT). The outcome measures were need for neurological intervention, clinically important brain injury, and any acute brain injury on CT. For this study, chi-square recursive partitioning (RP) analyses (KnowledgeSEEKER) were used to derive a more sensitive model. Statistical measures included comparison of measures by chi-square analysis. **RESULTS:** The CT Head (CCC) Study data-set contains 3,121 minor head injury cases with mean age 38.7 years, males 68.4%, falls 30.9%, acute brain injury on CT 11.2%, important brain injury 8.1%, and required neurological intervention 1.4%. RP analyses lead to a new “ultra-sensitive” model with 1 additional variable, the object recall test, giving a total of 8 variables. Comparing the “ultra-sensitive” model to the original CT Head Rule:

Table 1. Comparison of new “ultra-sensitive” model to original Canadian CT Head Rule

Measure	Ultra-sensitive model, %	Canadian CT Head Rule, %	<i>p</i> value
CT rate	72.0	55.6	<0.0001
Any brain injury			
Sensitivity	96.3	92.0	0.02
Specificity	31.0	49.0	<0.0001
Important brain injury			
Sensitivity	99.6	98.4	0.18
Specificity	30.4	48.2	<0.0001
Neuro intervention			
Sensitivity	100.0	100.0	–
Specificity	68.7	68.7	–

CONCLUSIONS: This study has derived an “ultra-sensitive” version that is more sensitive but less specific and would require a higher CT rate than the original Canadian CT Head Rule. The accuracy and acceptability of this revised rule for minor head injury patients should be prospectively and explicitly validated in US settings.

Key words: clinical prediction rule, brain injury

006 The validity of a clinical model to predict the presence or absence of deep vein thrombosis in the emergency department.

Scheibel N, Spooner CH, Sukhrani N, Cunningham R, Kelly KD, Holroyd BR, et al. Mayo Clinic, Rochester, Minnesota.

OBJECTIVES: In patients presenting to the emergency department

(ED) with suspected deep vein thrombosis (R/O DVT), <25% are assigned a final diagnosis of DVT. A new clinical model (CM) to determine the pretest probability of DVT and guide efficient investigation has been developed. This study examined the validity of this CM in 3 urban North American EDs. **METHODS:** In a prospective fashion, patients were enrolled in 2 Canadian and 1 US ED. Patients >18 years of age with a R/O DVT were approached for enrollment. A CM was completed by the ED physician prior to obtaining any laboratory or diagnostic evaluation. The clinical model comprises eight examination and historical factors and is converted into risk categories (low, moderate, high). Patients were subsequently followed by telephone and through a database evaluation to confirm the diagnosis of DVT. **RESULTS:** Overall 1,067 patients presented to the 3 EDs with diagnosis of rule-out DVT; the CM was completed in 489 patients (46%). Patients in the CM group had the following risk classifications: 217 (45%) low, 164 (34%) moderate and 98 (20%) high risk for DVT. After follow-up, 17 (8%) low, 41 (25%) moderate and 39 (48%) high-risk patients were shown to have a proximal DVT ($p < 0.001$). Physician vs. CM estimates of risk agreed only moderately ($\kappa = 0.48$). In low, moderate and high risk groups, D-dimers were performed 39%, 40% and 33% of the time, ultrasound was first investigation in 79%, 75% and 72%, and venograms were performed 12%, 21% and 25%, respectively. **CONCLUSIONS:** Clinical models applied in the ED are valuable tools for improving quality of care. However, the DVT CM was used <50% of the time and investigations did not appear to be influenced by risk categorization. Further research is required to determine how to reduce practice variation in the ED.

Key words: deep vein thrombosis, diagnosis

007 Retrospective validation of the "New Orleans" criteria for minor head injury.

Stiell IG, Eisenhauer MA, Dreyer JA, Reardon M, Clement C, Wells GA, et al, for the CCC Study Group. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: The "New Orleans" criteria have been recently proposed to guide the need for computed tomography (CT) in minor head injury patients with a score of 15 on the Glasgow Coma Scale (GCS). This study retrospectively validated these criteria on an existing data-set of head injury patients. **METHODS:** This secondary data analysis was based on a prospective cohort study conducted in 10 Canadian emergency departments (EDs) and involving adults with loss of consciousness, amnesia, or confusion and GCS scores of 13–15. Physicians completed a 22-item standardized data-form prior to CT scan, and the outcome criterion was clinically important brain injury. Data collection also included CT reviews by study neuroradiologists, ambulance call reports and in-hospital records. For the current study, chi-square recursive partitioning analyses (Knowledge SEEKER) were performed using the 10 variables that corresponded to the 7 New Orleans criteria. Statistical measures included sensitivity, specificity and CT rate. **RESULTS:** The Canadian C-Spine/CT Head (CCC) Study data-set contains 2,489 minor head injury cases with a GCS score of 15 and these characteristics: injury above clavicle 74.6%, headache 58.8%, vomiting 20.9%, >60 years 14.0%, intoxication 8.0%, persistent amnesia 7.3%, seizure 0%, important brain injury on CT 4.8%, required neurological intervention 0.8%. For the primary outcome, important brain injury, the New Orleans criteria classified patients with a sensitivity of 97.5% (95% confidence interval [CI] 92%–99%) and specificity of 8.4% (95% CI 7%–10%). For the outcome, need for neurological outcome, the criteria had a sensitivity of 90% (95% CI 67%–96%). According to the

criteria, 91.9% (95% CI 91%–93%) of patients would require CT. **CONCLUSIONS:** The criteria performed with good sensitivity for important brain injury and fair sensitivity for neurological intervention and would have required almost all GCS-15 head injury patients undergo CT. The New Orleans criteria should be further explicitly and prospectively evaluated for accuracy, reliability and potential impact prior to widespread clinical use.

Key words: brain injury, clinical prediction rule

008 Urgent imaging for suspected renal colic in the emergency department.

Papa L, Stiell IG, Wells GA, Battram E, Mahoney J. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: To predict which patients with suspected renal colic have severe obstruction and require urgent urinary tract imaging. Several studies suggesting that intravenous pyelogram (IVP) be delayed or eliminated have not suggested criteria. Clinical practice is known to be inaccurate in predicting severe obstruction. **METHODS:** This prospective cohort study included suspected renal colic cases presenting to 2 tertiary care hospital emergency departments (EDs). Patients had a 20-variable dataform completed by ED physicians and an IVP performed within 24 hours. All IVPs were reviewed by a radiologist and a urologist to identify those cases with severe ureteral obstruction (urine extravasation and/or no visualization of contrast beyond the obstruction after 2 hours). Categorical data were analyzed using Fisher's exact test, continuous variables assessed by independent sample 2-tailed *t*-test, and ordinal variables tested with Mann-Whitney *U* test. Those variables found to be associated with the outcome measure of severe obstruction ($p < 0.15$) were combined using logistic regression analysis. **RESULTS:** Of the 119 patients included in the analysis, 18 (15%) had severe obstruction identified on IVP. Four clinical variables were significantly correlated with having severe obstruction on IVP: i) residual pain at discharge ≥ 1 cm on VAS (OR = 7.8 95% confidence interval [CI] 1.6%–82.1%), ii) rebound tenderness on abdominal palpation (OR = 18.5, 95% CI 1.1%–303.0%), iii) vomiting (OR = 7.8 95% CI 1.0%–62.0%) and iv) persistent pain after 6 hours in the ED (OR = 18.6 95% CI 2.2%–159.0%). Hosmer–Lemeshow goodness of fit statistic was 7.4 for 6DF ($p = 0.283$). If all variables were positive there was a 99.4% probability of severe obstruction. If all variables were negative there was a 0.6% probability of obstruction. **CONCLUSIONS:** This preliminary study has identified clinical variables that could be used to identify those patients with renal colic who require urgent imaging. Future studies will prospectively validate this model.

Key words: clinical prediction rule, renal colic

009 Long-acting beta-agonists following emergency department discharge: a randomized controlled trial.

Rowe BH, Travers A, Brown J, Tyler L, Folk D, Spooner CH, Kelly KD. University of Alberta, Edmonton, Alberta.

OBJECTIVES: One regimen to reduce relapse following emergency department (ED) therapy for acute asthma includes oral prednisone and inhaled corticosteroid (ICS). We investigated the effect of adding a long-acting beta-agonist to this regimen for patients discharged from 3 Canadian EDs. **METHODS:** Patients aged 18–60 with acute asthma receiving <2000 mcg of beclomethasone dipropionate or equivalent were eligible. All patients received similar ED treatment and upon discharge received oral prednisone (50 mg \times 7 days) and short-acting inhaled beta-agonists. In a double blind fashion, patients were randomly assigned to receive either Advair (ADV; 1000 mcg/d fluticasone and

100 mcg salmeterol) or fluticasone alone (FLU; 1000 mcg/d) via dry powder delivery system. Patients were followed for 21 days or until relapse. The main outcome was the Asthma Quality of Life Questionnaire (AQLQ) score; the minimal clinically important difference for the AQLQ is 0.5/domain. RESULTS: 70 patients were enrolled (35 ADV; 35 FLU); the groups were similar at the outset. Full follow-up was achieved in 63 (90%) patients. The ADV group showed less impairment (ADV vs. FLU) for total (6.4 vs. 6.2) AQLQ, and the activity (6.4 vs. 6.2), environmental (6.5 vs. 6.1), emotional (6.3 vs. 6.1) and symptom (6.3 vs. 6.2) AQLQ domains at 21 days; no differences were clinically or statistically significant ($p > 0.1$). Relapse (11% vs. 23%; $p = 0.23$) and beta-agonist puffer use/day (1 vs. 2; $p = 0.22$) outcomes also favoured ADV at 21 days. Early inhaler compliance was high (66% vs. 83%, $p = 0.34$) and side effects were similarly rare in both the groups. CONCLUSIONS: Adding a long-acting beta-agonist to prednisone and ICS therapy does not appear to significantly improve quality of life for patients recovering from acute asthma. However, the promising trends that show a reduction in relapses and beta-agonist use suggest further large scale studies are required to verify these preliminary findings.

Key words: asthma, corticosteroids, quality of life

010 Are intubation conditions using rocuronium comparable to succinylcholine? A meta-analysis.

Perry JJ, Lee J, Wells GA. Clinical Epidemiology Unit, University of Ottawa, Ottawa, Ontario.

OBJECTIVES: To complete a systematic review to determine if rocuronium creates excellent intubation conditions as frequently as succinylcholine during rapid sequence induction (RSI). Individually, existing studies lack sufficient power to determine their equivalence. METHODS: Medline, Embase, and the Cochrane Controlled Trials Register databases were searched for controlled or randomized clinical trials (RCT). The search strategy included all generic and trade names for succinylcholine and rocuronium, anesthesia, neuromuscular blockade and a validated RCT filter. Intubation conditions were a required outcome. Foreign language journals were included, and references were hand searched. Two independent reviewers assessed studies for eligibility, data extraction and quality. Intubation conditions were scored using Goldberg's scale (excellent conditions defined as clear vocal cords, easy tube insertion, and no cough). A priori subgroup analysis was conducted using propofol for induction. The effect of narcotics, true versus modified RSI, and the dose of rocuronium were checked by sensitivity analysis. Data was analyzed with Metaview 4.0 for relative risk (RR) with a variable effects model. RESULTS: The search identified 40 articles. 10 articles were excluded for not meeting inclusion criteria, 2 were duplicate publications and 2 were abstracts with insufficient data. For the 26 studies included in the analysis, overall, rocuronium was inferior to succinylcholine, with a RR = 0.87 (95% confidence interval [CI], 0.81, 0.94) ($n = 1606$). Intubation conditions were similar in the propofol subgroup, with a RR = 0.96 (95% CI, 0.87, 1.06) ($n = 640$). A total sample size of 468 is required for equivalence ($\alpha = 0.05$, $\beta = 0.10$, MCID 12%, % expected with excellent conditions = 80%). Sensitivity analysis of the propofol subgroup demonstrated no effect of narcotics, true versus modified RSI, or the dose of rocuronium. Failed intubations ($n = 28$) were equivalent in both groups. CONCLUSIONS: Overall, succinylcholine creates excellent intubation conditions more reliably than rocuronium. If an alternative is required, rocuronium used with propofol creates intubation conditions equivalent to succinylcholine.

Key words: rocuronium, succinylcholine, intubation

011 Emergency department presentations of chronic obstructive pulmonary disease in Alberta.

Spooner CH, Yiannakoulis N, Holroyd B, Bullard M, Craig W, Klassen T, et al. University of Alberta, Edmonton, Alberta.

OBJECTIVES: Chronic obstructive pulmonary disease (COPD) is an increasingly common problem in North America. However, its burden on emergency departments (EDs) is virtually unknown. This study examines the epidemiology of COPD presentations to the ED using a provincial database. METHODS: All patients presenting to Alberta EDs were eligible for inclusion. Data were derived from a population of patients treated at Alberta EDs in 17 health regions over 1 year (fiscal 98/99). Data were extracted from computerized abstracts coded similarly across all regional EDs contained within the Ambulatory Care Classification System (ACCS) database. Diagnostic categories are recorded using ICD-9 coding by medical record nosologists in each hospital and represented the primary physician discharge diagnostic code. Patients aged 55 and over with a ICD-9 code compatible with COPD were selected for study; descriptive statistics and crude presentation rates are reported. RESULTS: Over 1 year, 1,493,659 ED visits were recorded; 21,147 (1.4%) patients aged 55 and over presented to the ED during this period with a diagnosis of COPD. Males (10,419; 50%) and females were similarly represented. The highest months for presentation are December–February (36%); daily variation is low however most presentations occur in the morning. Only 5,266 (44%) of patients present to the ED once per year, the rest make multiple presentations annually (up to 45). The provincial presentation rate is 10/1000 persons (regional range: 5–47/1000). The lowest ED presentation rates occurred in the 2 largest urban areas (population >500,000). An important percentage (28%) are admitted to hospital, few leave without medical care (<0.1%) and admission to ICU occurs in 1% of cases. CONCLUSIONS: Repeat ED presentations for COPD in the elderly are common in this jurisdiction. Severity is high and admission is more frequent than for other respiratory diseases. Further research is required to understand the regional variation and examine ED treatments.

Key words: utilization, obstructive lung disease

012 Comparison of Canadian versus US emergency department visits for asthma/COPD (chronic obstructive pulmonary disease) exacerbation among older adults.

Rowe BH, Cydulka RK, Camargo CA Jr, for the MARC Group. University of Alberta, Edmonton, Alberta.

OBJECTIVES: To compare emergency department (ED) visits for asthma/COPD (chronic obstructive pulmonary disease) exacerbations among adults age 55+ in Canada vs. the US. METHODS: Prospective, multicentre, inception cohort study. 23 EDs (4 Canadian and 19 US) enrolled patients (pts) 24 hrs/day for a median of 2 weeks, as part of the Multicenter Airway Research Collaboration. Enrolled pts underwent a structured interview in the ED and follow-up by telephone 2 weeks later. Inclusion criteria were prior MD diagnosis of asthma or COPD, current exacerbation of their obstructive airway disease, and age 55+. Chi-2, *t*-test, and Kruskal–Wallis (K–W) test were used as appropriate. RESULTS: Of the 371 enrolled pts, 62 (17%) were seen in Canadian EDs. Enrollment was similar in Canada vs. US sites (64% vs. 69% of consecutive pts, $p = 0.30$). Canadian pts were older (71 vs. 69 years, $p = 0.03$), more likely to be white (92% vs. 58%, $p < 0.001$), but less likely to have completed high school (37% vs. 54%, $p = 0.02$). Prior MD diagnosis of asthma only, asthma and COPD, and COPD only did not differ between Canadian and US pts ($p = 0.49$). Canadian and US pts also did not differ according to reported breathing diffi-

culty on arrival ($p = 0.11$). While pts in both countries were equally likely to receive steroids (74% vs. 64%; $p = 0.14$), Canadian pts were more likely to receive anticholinergics (92% vs. 77%, $p = 0.007$) and more likely to receive antibiotics (47% vs. 23%, $p < 0.001$) in the ED. Canadian and US pts were equally likely to be admitted overnight to the hospital (68% vs. 57%, $p = 0.11$) but Canadians were more likely to keep pts in the ED for 6+ hours (90% vs. 29%, $p < 0.001$). At 2-week follow-up, Canadian and US pts did not differ according to risk of having an ongoing exacerbation or a "relapse" requiring acute medical care (both $p > 0.15$). **CONCLUSIONS:** Among ED pts age 55+ with asthma/COPD exacerbations, compared to US pts Canadian pts were more likely to receive supplemental ED treatments and had longer ED stays, but had similar 2-week outcomes.

Key words: asthma, obstructive lung disease, utilization

013 The role of injury mechanism in the evaluation of patients with minor head injury.

Stiell IG, Lesiuk H, Clement C, Wells GA, De Maio VJ, Battram E, et al, for the CCC Study Group. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: Emergency department (ED) physicians frequently face the decision of ordering computed tomography (CT) for patients with minor head injury. This study measured the risk of brain injury associated with specific injury mechanisms for minor head injury patients. **METHODS:** This prospective cohort study was conducted as a component of the Canadian C-Spine/CT Head (CCC) Study in 10 Canadian EDs and involved adults with loss of consciousness, amnesia, or confusion and a Glasgow Coma Scale (GCS) score of 13–15. Physicians completed a 22-item assessment form prior to CT scan and the outcome criterion was clinically important brain injury on CT. Study nurses reviewed ambulance reports, ED records, and in-hospital records to classify each case according to 21 injury mechanisms and 8 dangerous motor vehicle collision (MVC) factors. Variables correlated with the outcome on univariate analysis were then assessed by forward stepwise logistic regression analysis. **RESULTS:** Among 3,121 patients enrolled over 36 months, 254 (8.1%) had important brain injury and 44 (1.4%) required urgent neurological intervention. The most common injury mechanisms were: falls 30.9%, MVC 25.8%, assault 10.7%, sports 9.9%, bicycle 6.7%, pedestrian struck 5.9%, head struck by object 5.8%, motorcycle 3.5%. After adjustment for demographic and clinical factors, analysis found the following mechanisms to be independently associated with increased risk of brain injury (odds ratios with 95% confidence intervals [CIs]): MVC ejected 15.0 (6.2–36.7), pedestrian struck by motor vehicle 6.2 (3.8–10.0), bicycle collision 3.6 (1.1–12.5), head hit by object 3.1 (1.6–6.3), fall >10 feet 3.1 (1.7–5.7), bull's eye damage to windshield 3.0 (1.2–8.0), fall 3–10 feet 2.2 (1.4–3.6). This model discriminated with an area under the receiver operating characteristic (ROC) curve of 0.90. **CONCLUSIONS:** Specific injury mechanisms place patients at increased brain injury risk and ED physicians should carefully ascertain details of the injury when making decisions regarding CT for minor head injury patients. The accuracy and reliability of these mechanism risk factors will be prospectively evaluated.

Key words: brain injury, diagnosis

014 Emergency department patients' opinions of screening for intimate partner violence.

Campbell SG, Crooks C, Wallace T, Venugopal R. Dalhousie University, Halifax, Nova Scotia.

OBJECTIVES: Universal screening for intimate partner violence

(IPV) in the emergency department (ED) has been advocated by numerous medical institutions. Implementation of policies to screen IPV, however, have met with numerous obstacles, one of which is the perception by emergency staff that patients might be offended by such screening if they had presented to the ED for problems unrelated to trauma. To assess the opinion of patients presenting to the ED, regarding a policy of universal screening of female ED patients for IPV. **METHODS:** A convenience sample of 250 undifferentiated ED patients were asked whether it was appropriate for all women to be asked if they had experienced violent or threatening behaviour from someone close to them. Patients in significant pain or in extremis were not approached. The Queen Elizabeth II IPV committee prospectively decided by consensus that approval of 85% of patients would be adequate to demonstrate that a significant majority of patients supported universal screening. **RESULTS:** Of 250 undifferentiated ED patients, ages ranged from 16–95 years, and 151 (60.4%) were female. 213 (85.2%) answered "yes" to the question. 30 (12%) answered "no," 5 (2%) had no opinion, and 2 (0.8%) could not be counted. There were no significant differences between the proportion of "yes" and "no" answers in the male and female groups; "yes" in 84.8% of males and 85.4% of females, and "no" in 10% and 13.2%, respectively. **CONCLUSIONS:** Universal screening for IPV of female patients presenting to the ED is supported by 85% of patients, and patient objections should not be seen as a reason to withhold questioning on the issue.

Key words: domestic violence, emergency

015 How important is mechanism of injury in predicting the risk of cervical spine injury?

Stiell IG, Clement C, De Maio VJ, Wells GA, Battram E, Morrison L, et al, for the CCC Study Group. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: To assist emergency care personnel by measuring the cervical-spine (C-spine) injury risk associated with specific blunt trauma injury mechanisms. The importance of injury mechanisms is a controversial issue in the trauma literature. **METHODS:** This prospective cohort study was conducted in 10 Canadian EDs and involved adult trauma patients at risk for neck injury, with stable vital signs and a Glasgow Coma Scale (GCS) score of 15. Physicians completed a 20-item data form for all patients who then underwent radiography to determine the outcome, important C-spine injury. Study nurses reviewed ambulance reports, ED records, and in-hospital records to classify each case according to 21 injury mechanisms and 8 dangerous motor vehicle collision (MVC) factors. Variables correlated with the outcome on univariate analysis were then assessed by forward stepwise logistic regression analysis, using SAS. **RESULTS:** Among 8,924 patients enrolled over 30 months, 151 (1.7%) had clinically important injury, including fracture (143), dislocation (23), and ligamentous instability (9). The most common mechanisms of injury were: MVC 67.0%, fall <3 feet 8.3%, fall 3–10 feet 4.4%, sports 2.9%, assault fist 2.6%. After adjustment for demographic and clinical characteristics, analysis found the following mechanisms to be independently associated with increased risk of C-spine injury (odds ratios with 95% confidence intervals [CIs]): axial load (e.g., diving) 14.2 (8.0–25.2), bicycle collision 9.6 (2.2–35.5), motorized recreational vehicle 8.9 (2.4–32.7), fall 3–10 feet 3.6 (2.0–6.4), fall >10 feet 3.1 (1.2–8.1), MVC >100 km/h 7.6 (3.4–17.0), MVC 60–100 km/h 7.5 (4.6–12.3), MVC rollover 3.8 (2.2–6.6), rear-end MVC 0.06 (0.01–0.5). For this model, Hosmer–Lemeshow goodness-of-fit statistic 0.63 for 7 degree of freedom (DF); area under the receiver oper-

ating characteristic (ROC) curve 0.93. **CONCLUSIONS:** Specific injury mechanisms put patients at much higher risk for C-spine injury and emergency care personnel should carefully ascertain details of the injury situation. Prospective studies will evaluate the accuracy and reliability of these mechanisms.

Key words: cervical spine, injury, diagnosis

016 Pediatric injuries in organized hockey: Does checking make a difference?

Parker MJ, Salter KL, Lipskie TL, Joubert GI. Department of Pediatrics, University of Western Ontario, London, Ontario.

OBJECTIVES: Ice hockey is a sport involving skills such as body checking. Recently, the minimum allowable checking age has been decreased in certain jurisdictions. The impact of checking on injury rates has been hotly debated. This study sought to determine injury rates in organized ice hockey, as reported in the Canadian Hospital Reporting and Prevention Program (CHIRPP) database, and what impact checking has on these rates. **METHODS:** A retrospective study was conducted using the CHIRPP database, a Canadian injury surveillance tool incorporating data from all 10 pediatric hospitals and 4 general hospitals since 1990. Hockey injury reports between January 1, 1994, to August 31, 1999, were analyzed. Age ranged from <1 to >19 years of age. The database was culled to include only organized ice hockey injury records. Statistical analysis was performed on these records comparing injury trends and relationship to checking by age and year of injury. **RESULTS:** Data from 12,879 records was analyzed with 4,118 involving checking. The 10–14 age group had the most injuries, with 62% checked and 58% non-checked. Over time, the number of injuries reported per year in the database has been consistent. Through the time period the number of non-checked injuries remained unchanged, while there was a trend toward fewer checking-related injuries (4.2% decrease, $p > 0.05$). Using hospital admissions as an indicator of injury severity, significantly more checking-related injuries were hospitalized ($p < 0.01$). **CONCLUSIONS:** Using the CHIRPP surveillance tool, organized ice hockey injuries have remained stable. There is a trend to decreased checking-related injuries over time. Despite this, injury severity as measured by hospital admission is significantly greater in the checked group. We conclude that checking in organized hockey does not increase injuries. However, increased injury severity in the checked group supports using caution in decreasing the minimum allowable checking age in organized ice hockey.

Key words: injury prevention, hockey, pediatric

017 The role of clinical assessment in the evaluation of patients with potential cervical-spine injury.

Stiell IG, Wells GA, Clement C, De Maio VJ, MacPhail I, Rowe BH, et al, for the CCC Study Group. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: Emergency department (ED) physicians frequently face the decision of ordering cervical-spine (C-spine) radiography for blunt trauma patients. This study measured the accuracy of clinical examination in identifying the likelihood of C-spine injury. **METHODS:** This prospective cohort study was conducted in 10 tertiary care EDs and involved alert (Glasgow Coma Scale [GCS] score of 15) and stable adult trauma patients at risk for neck injury. Physicians completed a 20-item standardized clinical data form for all patients who then underwent radiography to determine the outcome, important C-spine injury. Variables having univariate correlation with the outcome were assessed by forward stepwise logistic regression (LR) analysis (SAS). **RESULTS:** The 8,924 patients had these characteristics:

important C-spine injury 1.7%; mean age 36.8 years; history: ambulatory 67.5%, delayed onset neck pain 42.1%, paresthesias 9.7%, extremity weakness 3.1%; physical: able to rotate neck 55.3%, absence of neck tenderness 42.2%, upright position 37.3%, visible head injury 20.8%, facial injury 19.2%, distracting painful injuries 7.8%, intoxicated 4.2%, sensory deficit 2.0%, motor deficit 1.2%. After adjusting for other factors, LR analysis found the following clinical findings to be associated with risk of C-spine injury (odds ratios with 95% confidence intervals [CIs]): age >65 3.3 (2.1–5.1), paresthesias 2.5 (1.7–3.9), facial injury 1.8 (1.1–2.7), visible head injury 1.6 (1.0–2.4), delayed neck pain 0.5 (0.3–0.7), absence of neck tenderness 0.4 (0.2–0.6), able to rotate neck 0.07 (0.03–0.16). The following were not independently associated with C-spine injury: ambulatory at any time, extremity weakness, upright position, intoxication, distracting painful injuries, motor deficit, sensory deficit. Hosmer–Lemeshow goodness-of-fit statistic 0.78 for 8 DF; area under receiver operating characteristic (ROC) curve 0.91. **CONCLUSIONS:** Many clinical findings are significantly associated with either increased or decreased risk of C-spine injury and ED physicians should focus on these findings during assessment of alert trauma patients.

Key words: cervical spine, injury, diagnosis

018 The contribution of blood cultures to the clinical management of adult patients with community-acquired pneumonia: a prospective observational study.

Campbell SG, Anstee R, Ackroyd S, Dickenson G. Dalhousie University, Halifax, Nova Scotia.

OBJECTIVES: To assess the clinical utility of blood cultures (BC) in the management of community-acquired pneumonia (CAP). **METHODS:** A prospective observational study using the capital study population to investigate how the performance of blood cultures would affect the management and outcomes of adult patients presenting with CAP. The course of therapy of each patient with a positive BC result was examined to assess the influence of the results on clinical management. **RESULTS:** BC were drawn in 1,049 patients (60.2%), 289 (28%) outpatients and 760 (72%) inpatients. 50 “significant” organisms (from 49 [4.67%] patients) were identified. The yield of BC was 5.7% in admitted patients, and 2.1% in outpatients. Patients with CAP who had blood cultures performed had a 1.5% (16/1049) chance of having a change of therapy directed by the results of the culture. Patients in whom blood cultures were positive had 32.7% (16/49) chance of having a change in therapy determined by the result, and 59.2% (29/49) chance of having a course of therapy in contradiction with BC findings. Severity of illness, as measured by the Pneumonia severity score, compared poorly with the yield of BCs. In admitted patients, BCs were positive in 7.2% of patients in groups I and II, 5.0% in group III, 4.9% in group IV, and 6.9% in group V. **CONCLUSIONS:** Blood cultures have limited utility in the routine management of uncomplicated community-acquired pneumonia and should not form part of the routine management of CAP.

Key words: blood culture, pneumonia, cost-effectiveness

019 Influenza virus as a determinant of emergency department overcrowding.

Schull MJ, Mamdani M. Institute of Clinical Evaluative Sciences, Toronto, Ontario.

OBJECTIVES: The impact of influenza virus on emergency department (ED) utilization is controversial, and has not previously been studied. We sought to determine the relationship between circulating influenza virus and ED overcrowding. **METHODS:** Weekly totals of

laboratory-confirmed cases of influenza (types A and B) and other respiratory viruses in Toronto, Ontario, from 1996 to 1999 (weeks = 208) were obtained, along with data on weekly ED overcrowding, total ED visits, average patient age and sex distribution. Overcrowding was defined as episodes when EDs diverted all ambulances (Critical Care Bypass), and the average proportion of overcrowding time each week was calculated. Time series analysis using a multivariate autoregressive integrated moving average (ARIMA) model was conducted to longitudinally assess relationships between ED overcrowding and influenza cases, other respiratory virus cases, age, gender, and total number of ED visits. RESULTS: A mean of 10,957 ED visits occurred weekly. Patient age and percent female averaged 39.5 years and 51%, respectively. EDs were overcrowded an average of 0.2% to 23% of the time each week. Weekly influenza cases ranged from 0 to 236 (mean = 19), while other viruses ranged from 0 to 91 (mean = 22) per week. Surprisingly, in the multivariate ARIMA model, circulating influenza virus was a highly significant predictor of increased overcrowding ($p < 0.0001$). However, increases in other respiratory viruses was not a significant determinant ($p = 0.49$). As expected, total ED visits was a significant predictor of overcrowding ($p = 0.047$), while average patient age ($p = 0.93$) and percentage of female patients ($p = 0.28$) were not. ARIMA diagnostics showed good fit, and the model R^2 was 0.64. CONCLUSIONS: Increases in circulating influenza virus are a highly significant predictor of worsened ED overcrowding, even after controlling for ED utilization. Other respiratory viruses showed no association, despite being more prevalent in the community.

Key words: influenza, emergency department overcrowding

020 Predicting complications from renal colic after emergency department evaluation.

Papa L, Stiell IG, Wells GA, Battram E, Mahoney J. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: To prospectively assess clinical predictors of complications from urinary calculi after discharge from the emergency department (ED). METHODS: A cohort of patients with suspected renal colic from 2 tertiary care EDs were assessed prospectively. Emergency physicians completed a 20-question data form with the clinical findings of each patient. In addition, physician's estimated each patient's pre-test probability of developing complications. Once urinary calculi were confirmed with imaging, patients were discharged and followed via telephone at 1 and 4 weeks to assess development of complications. Complications were defined by: i) persistent pain by 4 weeks, or ii) development of fever ($>38^\circ\text{C}$) or iii) elevation of creatinine >150 mmol/L by 4 weeks. Univariate analysis tested which clinical variables correlated with complications. Fisher's exact test and independent sample t -test were conducted for nominal and continuous data respectively. RESULTS: Over a 6-month period, 150 patients with confirmed urolithiasis were followed, 72 (48%) (95% CI, 40%–56%) patients developed complications; 17 (24%) developed fever or renal failure; and 55 (76%) had persistent pain at 4 weeks. Clinical variables correlated with complications included pain at discharge ≥ 2 cm on a Visual Analog Scale (VAS) ($p = 0.022$), length of stay in ED ≥ 6.5 h ($p = 0.018$) and temperature $\geq 37.0^\circ\text{C}$ ($p = 0.026$) in the ED. Emergency physician judgement had a sensitivity of 31% and a specificity of 66%. They would have misclassified 50% of patients who developed complications. CONCLUSIONS: Physicians have difficulty predicting complications from calculi on initial ED presentation. Patients with elevations of temperature, pain at discharge or have a prolonged stay in the ED, should be

considered for early urology referral. Future studies will validate the validity of these predictive criteria.

Key words: renal colic, diagnosis

021 The utility of blood cultures in the management of upper urinary tract infection.

McInnes JG, Murray HE, Worrall J. Queen's University, Kingston, Ontario.

OBJECTIVES: Studies challenge the use of routine blood cultures in acute pyelonephritis; however, guidelines do not exist for their appropriate use. An examination of the value of blood cultures in the routine workup of acute pyelonephritis and urosepsis was conducted in order to identify clinical and laboratory predictors of bacteremia in these patients. METHODS: All charts for patients seen at a tertiary care referral centre emergency department between October 1996 and March 1998 with a primary diagnosis of acute pyelonephritis or urosepsis were reviewed. Patients under 16 years of age, or with duplicate visits were excluded. Historical features, physical and laboratory findings were recorded. Analyses included descriptive statistics, bivariate and multivariate associations. RESULTS: Of the 158 patients who met inclusion criteria, 110 (69.6%) had blood cultures performed. Growth was observed in 28 (25.4%) blood cultures. Antibiotics were not changed due to culture results. Elevated urea (>7.5 mmol/L), temperature $>38.4^\circ\text{C}$ and an abnormal band count ($>0.7 \times 10^9/\text{L}$) were all statistically significant predictors of bacteremia on bivariate analysis ($p < 0.05$). Multivariate analysis identified only temperature $>38.4^\circ\text{C}$ (odds ratio [OR] 2.65, 95% CI 1.03–6.83) and abnormal band count (OR 2.00, 95% CI 1.12–3.55) as predictors of bacteremia. CONCLUSIONS: No change in antibiotics was observed based on blood culture results. Fever and an abnormal band count appear to predict bacteremia. Prospective validation of clinical and lab predictors of bacteremia is required.

Key words: blood cultures, pyelonephritis

022 The epidemiology of acute allergy presentations in Alberta.

Rowe BH, Johnson D, Yiannakoulis N, Spooner CH, Holroyd B, Bullard M, et al. University of Alberta, Edmonton, Alberta.

OBJECTIVES: Many patients with allergic reactions and anaphylaxis present to the emergency department (ED) and despite potentially serious consequences limited information exists about this group. This study examines the epidemiology of acute allergy presentations to the ED using a unique data set. METHODS: All cases of acute allergy and anaphylaxis from all ages presenting to Alberta EDs were eligible for inclusion. Data were derived from a cohort of patients treated at Alberta EDs in 17 health regions over 1 year (fiscal 98/99). Data were extracted from the Ambulatory Care Classification System (ACCS) database, which contains computerized abstracts coded similarly across regions. Allergy and anaphylaxis was coded using ICD-9 coding by medical record nosologists in each hospital and represented the primary physician discharge diagnosis. Descriptive statistics and crude presentation rates are presented. RESULTS: Acute allergic reactions accounted for 8,733 (0.6%) of the 1.494 million annual visits to EDs in Alberta. Males (4,469; 51%) and females were similarly represented; patients <19 years old were involved in 2,856 (33%) of all cases. Most presentations (6,462 [74%]) occurred in the summer months (June–Sept.). Multiple visits were uncommon. The provincial ED presentation rate was 3/1000 persons (range 1–8/1000). The lowest ED presentation rates occurred in the 2 largest urban areas (population $>500,000$). Most (8,567; 98%) patients were discharged from the ED, with no variation among age groups.

Overall, 161 (2%) were admitted; no deaths in the ED setting were noted. **CONCLUSIONS:** Allergy is a common ED problem with very low acuity. Given the marked variations in presentation rates, it is important to further examine these findings and determine the etiology and treatment of allergy and anaphylaxis in the ED.

Key words: allergy, anaphylaxis

023 Accuracy and reliability of the Object Recall Test for patients with minor head injury.

Stiell IG, McKnight RD, Lesiuk H, Brison RJ, Clement C, Wells GA, et al, for the CCC Study Group. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: Patients with minor head injury may harbour serious and sometimes life-threatening brain injuries. This study evaluated the accuracy and reliability of the Object Recall Test for the ED assessment of these patients. **METHODS:** This prospective cohort study enrolled adults with loss of consciousness, amnesia, or confusion and a Glasgow Coma Scale (GCS) score of 13–15. Physicians in 10 tertiary care EDs assessed each patient for the Object Recall Test prior to computed tomography (CT) scan and, where feasible, 2nd physicians performed interobserver assessments. The 2-minute Object Recall Test consisted of showing patients 3 objects (pen, watch, nose) and asking them to recall the objects after an interval of 2 minutes, and was scored from 0 to 3. The outcome standards were “need for neurological intervention,” “clinically important brain injury,” and “any brain injury on CT.” Analyses included kappa coefficient, chi-square, receiver operating characteristic (ROC) curve areas, sensitivity, and specificity. **RESULTS:** Among 2,672 patients enrolled over 36 months, the mean age was 38.4 (range 16–97), 68.8% were male, 32 (1.2%) underwent neurological intervention, 206 (7.7%) had important brain injury, and 283 (10.6%) had some acute brain injury on CT. The weighted kappa for interobserver agreement in 86 patients was 0.64 (95% CI 0.50–0.78). Measures of accuracy (95% CIs) for the 3 outcomes were:

Table 1. Measures of accuracy (95% confidence intervals) for the 3 outcomes of the study

Measure	Neuro intervention	Important injury	Any brain injury
Univariate <i>p</i>	<0.0001	<0.0001	<0.0001
ROC curve area	0.74 (0.65–0.83)	0.71 (0.67–0.75)	0.67 (0.63–0.71)
Sensitivity	0.78 (0.60–0.88)	0.72 (0.65–0.77)	0.66 (0.60–0.71)
Specificity	0.56 (0.54–0.58)	0.58 (0.56–0.60)	0.58 (0.56–0.60)

CONCLUSIONS: Despite good reliability and strong association with clinical outcomes, the Object Recall Test exhibits only fair discrimination and sensitivity. This test is not accurate enough to be used alone but may prove useful as one component of an algorithm for assessing minor head injury patients.

Key words: brain injury, clinical prediction rule, diagnosis

024 The relationship between out-of-hospital cardiac arrest survival and community bystander cardiopulmonary resuscitation rates.

De Maio VJ, Stiell IG, Wells GA, Martin MT, Spaite DW, Nichol G, et al, for the OPALS Study Group. University of Calgary, Calgary, Alberta.

OBJECTIVES: While recent data have re-emphasized the role of bystander cardiopulmonary resuscitation (CPR) in the chain of sur-

vival for out-of-hospital cardiac arrest, its importance has not been clearly quantified. The objective of this study was to measure survival as a function of community bystander CPR rates. **METHODS:** This prospective cohort study included all adult, cardiac etiology, out-of-hospital cardiac arrests from Phases I and II of the Ontario Prehospital Advanced Life Support (OPALS) Study. Patients in the 20 study communities received a BLS-D (Basic Life Support) level of care by emergency medical services (EMS), but no Advanced Life Support (ALS). Logistic regression (LR) identified adjusted CPR rates using covariates found to be independently associated with bystander CPR. Survival was then modeled using the adjusted CPR rates. The logistic equation was used to estimate community survival for incremental bystander CPR rates. **RESULTS:** From 1991–97, there were 343 (3.7%) survivors among 9,218 cases treated. The overall bystander CPR rate was 15.2%. LR analysis found the following factors associated with bystander CPR (odds ratios with 95% confidence intervals [CIs]): male sex 1.21 (1.05–1.39), age/10yrs 0.83 (0.80–0.87), non-winter season 1.20 (1.04–1.38), witnessed arrest 2.39 (2.10–2.73), ventricular fibrillation/ventricular tachycardia (VF/VT) rhythm 2.13 (1.88–2.43). Hosmer–Lemeshow goodness-of-fit statistic 0.86 for 8 DF; area under receiver operating characteristic (ROC) curve 0.70. The survival function, using the adjusted CPR rate and the defibrillation response interval, indicates the odds of survival with increasing CPR rate were 1.71 (1.61–1.81) per 5% increase. The survival function predicts, for successive 5% increments: i) survival rates, and ii) additional lives saved per year in the OPALS Study communities: 25% (6.3%; 41 lives), 30% (10.4%; 107 lives), 35% (16.7%; 208 lives), 40% (25.7%; 352 lives). **CONCLUSIONS:** Improved community bystander CPR rates are associated with dramatically increased out-of-hospital arrest survival in a predictable fashion. EMS and public health directors should focus significant efforts towards improving their community bystander CPR rate.

Key words: cardiac arrest, resuscitation, emergency medical services

025 How accurate is clinical examination in the evaluation of patients with minor head injury?

Stiell IG, De Maio VJ, Clement C, Wells GA, Dreyer JA, McKnight RD, et al, for the CCC Study Group. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: Emergency department (ED) physicians frequently evaluate and make management decisions for minor head injury patients. This study assessed the accuracy of common clinical symptoms and signs for predicting brain injury in these patients. **METHODS:** This prospective cohort study was conducted in 10 Canadian EDs and involved adults with loss of consciousness, amnesia, or confusion and a Glasgow Coma Scale (GCS) score of 13–15. Physicians were trained to complete a 22-item standardized clinical assessment form prior to computed tomography (CT) scan. Variables correlated with the outcome criterion, clinically important brain injury, on univariate analysis were then assessed by forward stepwise logistic regression analysis (SAS). **RESULTS:** The 3,121 patients enrolled over 36 months had these characteristics: important brain injury 8.1%, required neurological intervention 1.4%, mean age 38.7, amnesia 87.9%, GCS score 15 79.8%, witnessed loss of consciousness 46.5%, intoxicated 12.3%, chronic alcohol abuse 10.9%, repeated vomiting 9.6%, basal skull fracture signs 6.7%, drop in GCS score 2.9%, pupils not equal and reactive 1.2%, lateralizing motor weakness 1.1%. After adjustment for demographic and mechanism factors, LR analysis found the following clinical findings to be associated with risk of brain injury (odds ratios with 95% confidence intervals [CIs]): GCS <15 by

2 hours 7.3 (5.1–10.3), signs of basal skull fracture 5.0 (3.3–7.6), drop in GCS score 4.5 (2.6–7.9), age >65 4.2 (2.9–6.1), repeated vomiting 3.9 (2.6–5.8), possible open skull fracture 3.2 (1.8–5.7), amnesia before injury >30 minutes 1.5 (1.1–2.2). The following findings were not independently associated with brain injury: chronic alcohol abuse, loss of consciousness >5 min, motor weakness, unequal pupils, object recall test, intoxication. The area under the receiver operating characteristic (ROC) curve for this model was 0.895. **CONCLUSIONS:** In their assessment of minor head injury patients, ED physicians should emphasize the many clinical findings which have been shown to be strongly associated with the likelihood of brain injury.

Key words: brain injury, diagnosis

026 Potential impact of public access defibrillation based upon cardiac arrest locations.

De Maio VJ, Stiell IG, Wells GA, Martin MT, Doherty J, Spaite DW, et al, for the OPALS Study Group. University of Calgary, Calgary, Alberta.

OBJECTIVES: Community public access defibrillation (PAD) programs are becoming commonplace despite the fact that the results of the PAD Trial are not yet known. This study evaluated the potential impact of PAD programs based upon an analysis of out-of-hospital cardiac arrest locations. **METHODS:** As part of the Ontario Pre-hospital Advanced Life Support (OPALS) Study, this prospective cohort study included all adult out-of-hospital cardiac arrests in 3 medium-sized cities. Emergency medical services (EMS) response included firefighter defibrillation and Advanced Life Support (ALS) paramedics. Based upon review of ambulance reports and dispatch records, cases were classified into one of 23 pick-up locations and then grouped into 5 categories: small residential, large residential, streets/outdoors, small public buildings, and large public buildings. Data analyses included descriptive statistics and sensitivity analyses to estimate the impact of doubling and tripling survival rates on additional lives saved per year. **RESULTS:** From 1995–2000, there were 1,373 consecutive cardiac arrests and characteristics included: mean age 68.6, male gender 66.5%, bystander witnessed 47.8%, bystander cardiopulmonary resuscitation (CPR) 16.1%, fire first 74.6%, rhythm ventricular fibrillation/ventricular tachycardia (VF/VT) 33.6%, median defibrillation response interval 5.1 minutes, survival to hospital discharge 3.7%. Cardiac arrest locations were: small residential 56.1%, large residential 27.8%, streets/outdoors 7.9%, small public buildings 3.4%, large public buildings 4.8%. The number of additional lives that would be saved per year in each location if the overall survival rates doubled and tripled, respectively were: small residential 4, 8; large residential 2, 3; streets/outdoors 2, 4; small public buildings 1, 2; large public buildings 1, 3. **CONCLUSIONS:** Less than 5% of cardiac arrests occur in large public buildings and the potential for lives saved with PAD appears to be modest. EMS and public health directors should recognize the limited potential of PAD and not overlook other methods for improving cardiac arrest survival.

Key words: cardiac arrest, resuscitation, public access defibrillation

027 How well does the Canadian CT Head Rule perform in minor head injury patients with a Glasgow Coma Scale score of 15?

Stiell IG, Wells GA, Clement C, MacPhail I, Rowe BH, Holroyd B, et al, for the CCC Study Group. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: The traditional neurosurgical definition of “minor head injury” includes patients with scores of 13–15 on the Glasgow Coma Scale (GCS), and the Canadian CT Head Rule was derived accordingly. Because many ED physicians believe that only GCS

scores of 15 truly represent “minor,” this study evaluated the accuracy of the Canadian CT Head Rule when restricted to patients with GCS 15. **METHODS:** This secondary data analysis was based on a prospective cohort study conducted in 10 Canadian EDs and involved adults with loss of consciousness, amnesia, or confusion and a GCS score of 13–15. Physicians completed a 22-item data form for all patients who then underwent CT scan to determine the outcome measure, important brain injury. For the current study, chi-square recursive partitioning analyses (KnowledgeSEEKER) were performed on the sub-set of patients presenting with a GCS score 15. Statistical measures included sensitivity, specificity, and computed tomography (CT) rate. **RESULTS:** The Canadian C-Spine/CT Head (CCC) Study dataset contained 2,489 minor head injury cases with GCS 15 and these characteristics: male 66.6%, arrived by ambulance 68.4%, fall 30.9%, motor vehicle collision (MVC) 25.7%, assault 9.6%, brain injury 4.8%, neurological intervention 0.8%. The 5 “high-risk” factors from the CT Head Rule predicted need for neurological intervention with sensitivity 100% (95% CI 83%–100%), specificity 80.2% (79%–82%), and required CT rate 20.4%. The additional 2 “medium-risk” factors predicted important brain injury with sensitivity 96.6% (95% CI 91%–98%), specificity 54.5% (52%–56%), and required CT rate 47.9%. Equally efficient for GCS 15 patients would be a rule that substituted “any drop in GCS” for “did not reach GCS 15 within 2 hours.” **CONCLUSIONS:** When applied to minor head injury patients with GCS score 15, the Canadian CT Head Rule performs with a high degree of sensitivity and efficiency and would require only 48% of these patients undergo CT. Ongoing studies will explicitly and prospectively validate these findings.

Key words: brain injury, clinical prediction rule

028 What are the outcomes of patients classified as having clinically unimportant cervical-spine injury?

Stiell IG, Clement C, Lesiuk H, McKnight RD, Wells GA, De Maio VJ, et al, for the CCC Study Group. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: The Canadian C-Spine Rule was recently developed to help ED physicians identify which alert and stable blunt trauma patients are at risk for clinically important cervical-spine injury (ICI). This methodological sub-study evaluated the clinical validity of the

Table 1. Characteristics of the 151 (1.7%) clinically important C-spine injury (ICI) cases and the 28 (0.3%) clinically unimportant C-spine injury (CUCI) cases in this study

Characteristic	ICI cases	CUCI cases	p value
Age, yr	45.0	41.4	0.38
Fracture	95%	100%	0.21
Dislocation	23%	0%	0.03
Ligament injury	6%	0%	0.19
Admitted	87%	43%	<0.0001
Treatment	96%	43%	<0.0001
Int. fixation	17%	0%	0.02
Halo	46%	0%	<0.0001
Brace	11%	7%	0.52
Rigid collar	32%	36%	0.68
Neuro deficit	6%	0%	0.18
Telephone follow-up			
Severe pain	11%	0%	0.17
ROM restrict	73%	38%	<0.01
Using collar	89%	56%	<0.001
Normal activity	9%	31%	0.02

concept of "clinically unimportant cervical-spine injury" (CUCI), as previously endorsed by a survey of academic neurosurgeons and spine surgeons. **METHODS:** The prospective cohort CCC Study enrolled alert (Glasgow Coma Scale [GCS] score 15) and stable adult trauma patients at risk for neck injury at 10 Canadian EDs. Data collection included physician dataforms, plain and computed tomography (CT) film reviews by study neuroradiologists, in-hospital records, and 14-day telephone follow-up. Patients were considered to have CUCI, and therefore require neither specialized treatment nor follow-up, if they had one of these injuries: isolated osteophyte avulsion, isolated transverse process avulsion, isolated spinous process avulsion, and simple compression <25% of body height. The current study compared the characteristics of ICI and CUCI patients by chi-square and Student's *t*-test analyses. **RESULTS:** Among the 8,924 patients, there were 151 (1.7%) ICI cases and 28 (0.3%) CUCI cases (see Table 1). **CONCLUSIONS:** Patients with CUCI had fewer admissions and follow-up problems. No patient with CUCI had an unstable injury, developed neurological deficit, or required invasive treatment. This study confirms the validity of the concept of CUCI for alert and stable C-spine injury patients.

Key words: cervical spine, injury, diagnosis

029 Emergency department patient willingness to participate in complementary and alternative medicine research.

Abu-Laban RB, van Beek CA, Wu J, Quon J. University of British Columbia, Vancouver, British Columbia.

OBJECTIVES: The emergency department (ED) is a unique potential location for recruitment into studies of complementary and alternative medicine (CAM) therapies. To assess the feasibility of various studies, we sought to determine the stated willingness of ED patients with acute musculoskeletal complaints to participate in CAM research for their presenting problem and the characteristics of this population. **METHODS:** From Oct. 16, 2000 to Nov. 21, 2000 all adults presenting to a tertiary ED weekdays between 10am and 6pm with acute musculoskeletal complaints involving the spine, upper extremity or lower extremity were approached by a research nurse unless precluded by pain or communication barriers. After being presented background information, consenting patients were asked a series of standardized questions during a 15 minute interview prior to physician assessment. **RESULTS:** Of 107 eligible patients, 93 participated (87%). Most symptoms began on the day of presentation (44%) or the previous week (41%). The mean age of those studied was 38 years and 56% were male. Most presenting problems involved the ankle/foot (29%), multiple sites (19%), the lumbosacral region (14%) or the wrist/hand (14%). Seventy-six percent of patients had utilized CAM previously and 13% were currently using CAM for their presenting problem. The majority of patients stated an informed hypothetical willingness to enroll in a CAM study: 74% traditional Chinese medicine (69/93: 95% confidence intervals [CI] 64.1%–82.7%); 70% chiropractic (65/93: 95% CI 59.5%–79.0%); and 92% other CAM therapies (86/93: 95% CI 85.1%–96.9%). Of patients asked, 99% stated they would comply with 4–6 weeks of outpatient follow-up and 70% stated they would participate in a placebo-controlled study. Logistic regression modeling was performed for secondary purposes to determine predictors of participation willingness. **CONCLUSIONS:** ED patients with acute musculoskeletal complaints have a high stated willingness to participate in CAM research, even if this involves outpatient follow-up and/or a placebo-controlled design. ED-based CAM research appears feasible and should be pursued.

Key words: alternative health care

030 Survey of computer use in emergency medicine staff and residents.

Cummings G, Sher A, Hayward R, Rowe BH. University of Alberta, Edmonton, Alberta.

OBJECTIVES: Easily accessible computer resources made available in emergency medicine (EM) may improve the use of valid health information in both the clinical and non-clinical setting. This study surveys the EM staff after access to a computer-based resource of evidence-based health information. **METHODS:** CHE/CLINT is a single sign-on, password-protected, desktop application for medical information resource management. An EM-specific desktop was produced with journals, online resources, and important links and access was provided to 70 staff and resident EM users at 2 major teaching hospitals affiliated with the University of Alberta. Following instruction and 3–6 months of use, a survey was distributed via email to all users. Up to 3 email send outs were performed. The 22-question survey examined user computer background, use of CHE/CLINT, and resource needs. Staff were divided into users (>2 log-ins) and non-users (<2 log-ins). **RESULTS:** Overall, 58 (80%) of staff returned completed questionnaires; 56 (76%) eligible users had logged into this program. Physicians in the non-user vs. user groups perceive the system to be an equally valuable resource (4.8 vs. 4.2 out of 5; $p > 0.1$). Non-users were more often Macintosh users (37% vs. 7%, $p < 0.01$) and less comfortable using the CHE/CLINT application (2.5 vs. 4.4 out of 5; $p < 0.01$). Nonusers did not differ from users in comfort with computers, internet access, or other demographic factors (all $p > 0.1$). However, users more frequently select electronic sources first when searching for solutions to information needs (43% vs. 0%, $p < 0.01$). **CONCLUSIONS:** While this knowledge-based single sign-on system has been explored by many users, it has not yet gained widespread acceptance by EM physicians. However, even non-users remain active in other methods of information retrieval. Further research is required to determine how to encourage EM staff to more effectively acquire information relevant to their practices.

Key words: medical informatics

031 Ambulance diversion increases transport delays for patients with chest pain.

Schull MJ, Morrison LJ, Vermeulen M, Redelmeier DA. Department of Emergency Services, and Clinical Epidemiology Unit, Sunnybrook and Women's College Health Sciences Centre, Toronto, Ontario.

OBJECTIVES: Emergency department overcrowding and ambulance diversion is increasing across North America. We sought to determine the impact on ambulance transport of cardiac patients. **METHODS:** Data on consecutive chest pain patients transported to hospital by ambulance in Toronto, Canada, were obtained for 2 time periods: February to May 1997 ($n = 1563$) vs. February to May 1999 ($n = 1782$). These 2 periods were chosen because they reflected times of low and high emergency department (ED) overcrowding respectively. Quantile regression of 90th percentile intervals was utilized for all analyses. Multivariate analyses modeled transport intervals according to period, weekday, time of day, geographic location of patient, dispatch priority, case severity, return priority, and the number of other chest pain patients transported within two hours of the index transport. **RESULTS:** There were no significant differences in patient characteristics according to time period (i.e., weekday, time of day, dispatch priority, case severity, return priority, or geographic location), despite a 14% increase in the number of patients transported in 1999 ($p < 0.0001$). The 90th percentile System Response Interval increased 10% from 1997 to 1999 (9.7 min [95% confidence

interval (CI) 9.5–10.0] vs. 10.7 [95% CI 10.4–10.9] respectively), while the On-Scene Interval decreased 8% (28.0 min [95% CI 27.3–28.6] vs. 25.8 [95% CI 25.2–26.3] respectively). The largest delay was in Transport Interval, which increased by 28% from 1997 to 1999 (13.4 min [95% CI 12.8–13.9] vs. 17.2 [95% CI 15.9–18.2] respectively). The Total Prehospital Interval did not change significantly. In multivariate analyses, time period remained a significant predictor of delayed Transport Interval ($p < 0.0001$). CONCLUSIONS: There has been a 28% delay in the ambulance Transport Interval for chest pain patients associated with increased ambulance diversions. On an ecologic level this may result in some patients with acute coronary syndromes dying due to delays to definitive treatment. *Key words: emergency overcrowding, emergency medical services*

032 Use of a structured care map in the emergency department to improve asthma care.

Chahal A, Rowe BH, Spooner CH, Wilson D, Senthilselvan A. University of Alberta, Edmonton, Alberta.

OBJECTIVES: This study examines the implementation of a structured asthma care map (CM) to standardize the emergency department (ED) treatment of acute asthma. METHODS: A retrospective before–after review of hospital charts was conducted on 2 15-month periods, before (PRE) and after (POST) the implementation of an ED CM. All patients between 18 and 65 presenting to the ED with a primary diagnosis of acute asthma were eligible. A standardized form was used to abstract data from a random sample of charts from each period. A priori, criteria were established to determine the level of completion and success of the CM. RESULTS: Three hundred patients' charts (150 PRE, 150 POST) were selected. Patient characteristics were similar at the outset; however, patients in the POST period had lower mean peak expiratory flow (PEF). The gender ratio was 1:1; the mean age was 32 years. In the POST period, the care map was used in 100 (67%) cases, documentation of markers of severity increased, use of systemic corticosteroids occurred earlier ($p = 0.02$) and more often (68% vs. 57%, $p = 0.04$), and prescription of inhaled corticosteroids increased (57% vs. 41%, $p = 0.006$); but PEF recordings were unchanged (87%, $p = 0.9$). Mean length of stay in the ED was longer in the POST period (345 vs. 266 minutes, $p = 0.01$). Admission rates during both periods were low (PRE: 13% vs. POST: 20%; $p = 0.28$) and documented use of oral steroids on discharge remained the same (57% vs. 66%, $p = 0.12$). CONCLUSIONS: A standardized ED asthma CM was widely accepted, improved chart documentation, improved some aspects of in-ED care, and increased the prescription of preventive medications on discharge. However, care is often still delayed and research is required to evaluate other strategies to improve acute asthma care.

Key words: asthma, quality

033 Outpatient treatment of deep vein thrombosis from the emergency department: clinical outcomes, patient satisfaction and economic analysis.

Zed PJ, Cook TR, Filiatrault L, Busser JR. CSU Pharmaceutical Sciences and Department of Emergency Medicine, Vancouver Hospital and Health Sciences Centre, Vancouver, British Columbia.

OBJECTIVES: Low-molecular-weight heparins (LMWH) have been shown to be safe, effective and economically attractive for the outpatient treatment of deep vein thrombosis (DVT). The Vancouver Hospital and Health Sciences Centre (VHHSC) outpatient DVT program was implemented in June 1999 to take advantage of this safe, effective and economically attractive therapy. To determine if the

VHHSC outpatient DVT program is safe and effective and to assess the economic impact compared to inpatient management. Also, to evaluate patient satisfaction with the outpatient program. METHODS: Patients were enrolled in the outpatient program after a radiographically diagnosed DVT by an emergency physician. Eligible patients returned daily to hospital to receive tinzaparin 175 u/kg subcutaneously daily for a minimum of 5 days and warfarin until their international normalized ratio (INR) >2 on 2 consecutive days. Incidence of recurrent venous thromboembolic events (RVTE) at 3 and 6 months, bleeding complications and thrombocytopenia were evaluated. Economic assessment was determined by comparing total costs of therapy for each outpatient to data collected retrospectively from inpatients treated with unfractionated heparin and warfarin. Patient satisfaction in the outpatient DVT program was established by a patient satisfaction survey. RESULTS: Fifty-three patients were treated in the program for a mean length of treatment of 5.7 days. No patients developed a RVTE at 3 months ($n = 39$), while only one patient of the 30 evaluable at 6 months experienced a recurrence (3.3%) post discharge from the program. No patient experienced a major bleeding complication or developed thrombocytopenia while 2 patients (3.8%) experienced a minor bleed, both had INRs within normal therapeutic range (INR = 2–3). Average cost/treatment/inpatient was \$2,214.99 compared to \$556.27 for outpatient therapy, representing a cost savings of \$1,658.72 for every DVT treated using the DVT outpatient program. These 53 patients represent 302 admission days avoided and a \$87,912.16 cost avoidance as a result of outpatient management. Overall, 93% of patients were very satisfied or satisfied with the outpatient program. CONCLUSIONS: The ED-based outpatient DVT program is safe, effective and economically attractive in addition to providing high patient satisfaction.

Key words: deep vein thrombosis, low molecular weight heparins

034 An analysis of stroke patient eligibility for tissue plasminogen activator in a Canadian city.

Barber PA, Demchuk A, Hill M, Buchan A. Department of Clinical Neuroscience, University of Calgary, Calgary, Alberta.

OBJECTIVES: Alteplase (tissue plasminogen activator [tPA]) is an effective treatment of acute ischemic stroke if used within 3 hours. However, thrombolytic therapy in hyperacute stroke will not have a major impact on death and dependency unless it is accessible to more patients. We identified the reasons why most patients with ischemic stroke did not receive intravenous alteplase and assessed the community impact in a large North American city. METHODS: Consecutive patients with acute ischemic stroke were identified in a prospective registry of stroke patients at a university teaching hospital between October 1996 and December 1999. Additional patients with ischemic stroke were identified that were admitted to one of three other Calgary hospitals during the study period. The Oxford Community Stroke Programme Classification was used to record type and side of stroke. The primary aim of this study was to determine the reason patients with ischemic stroke did not receive intravenous alteplase therapy. RESULTS: Of 2,165 stroke patients presenting to the university hospital 1,168 (53.9%) were diagnosed with ischemic stroke, 31.8% with intracranial hemorrhage (intracerebral, subarachnoid or subdural) and 13.9% with transient ischemic attack. 84/314 (26.7%) patients admitted within 3 hours of stroke symptom onset received intravenous alteplase. Among patients arriving within 3 hours of onset, the major reasons for exclusion were mild stroke (13.1%), clinical improvement (18.2%) and perceived protocol exclusions (12%). Of those patients whose strokes were considered too mild or were documented to have had significant improvement, 32% either remained dependent at hos-

pital discharge or died during hospital admission. Delay in presentation to emergency department beyond 3 hours excluded 854/1168 (73.1%). A total 1,806 ischemic stroke patients were admitted to Calgary hospitals during the study period, of which 4.7% received intravenous alteplase. **CONCLUSIONS:** The effectiveness of thrombolysis is dependent on understanding why patients are excluded from its use. Efforts need to be made to improve both the eligibility of patients for alteplase therapy and the appropriate interpretation of national guidelines through health education programs, and by developing organized acute stroke care infrastructure within communities.
Key words: stroke, tissue plasminogen activator, thrombolysis

035 DC cardioversion in atrial fibrillation: a survey of practice by Canadian emergency physicians.

Borgundvaag B, Owens H. Mount Sinai Hospital, Toronto, Ontario.

OBJECTIVES: Atrial fibrillation (AF) is the cardiac dysrhythmia most commonly encountered by emergency physicians (EPs). There are currently no guidelines for elective direct current cardioversion (DCCV) of patients in AF. We theorize this procedure could be performed safely by EPs. As a first step in establishing practice guidelines for DCCV, we conducted a survey of Canadian EPs regarding their practice. **METHODS:** All members of the Canadian Association of Emergency Physicians (CAEP) with a Canadian address ($n = 1,288$) were mailed a 15-point questionnaire regarding demographics and practice patterns. Chi-square analysis was performed to analyze practice patterns overall and also in relation to demographic variables. **RESULTS:** We received 659 (51%) responses. Five percent, 22% and 66% of EPs reported referring their patients to internists/cardiologists for rate control, chemical cardioversion and DCCV respectively. Reported rates for EP performance of DCCV were significantly higher for physicians who had completed a residency program in emergency medicine. A similar relationship was not seen for chemical cardioversion. There were significant differences in reported referral rates for both chemical and electrical cardioversion related to type of residency training. The magnitude of this effect appeared much greater for DCCV. Additionally, EPs who reported seeing more patients/month with AF indicated a significantly higher probability of chemically cardioverting these patients themselves. Such a relationship was not reported for DCCV. **CONCLUSIONS:** Although the majority EPs responding to this survey reported referring patients to internists/cardiologists for DCCV, those who reported completing a residency program in emergency medicine were significantly more likely to have ever performed DCCV, as well as more likely to report incorporating DCCV as a management strategy for management of uncomplicated AF. Potential exists to reduce both cost and length of stay in emergency departments through education in the use of DCCV for uncomplicated AF.

Key words: Atrial fibrillation, cardioversion, therapy

036 Canadian Activase for Stroke Effectiveness Study (CASES).

Hill MD, Buchan AM, for the CASES Investigators. University of Calgary, Calgary, Alberta.

OBJECTIVES: Therapy for acute stroke using rtPA was approved in Canada in February 1999. The Canadian Activase for Stroke Effectiveness Study Group was formed to study the use of recombinant tissue-type plasminogen activator (rtPA) in Canada in a 2-year post-marketing study. To both prospectively assess the safety of rtPA in the Canadian context and to examine whether the efficacy of rtPA for acute stroke, demonstrated in randomized trials, can be translated into effectiveness in routine clinical practice across Canada. **METH-**

ODS: The CASES group is a multi-stakeholder collaboration among the Canadian Stroke Consortium (CSC), the Canadian Stroke Society, the Heart and Stroke Foundation of Canada, Hoffmann-La Roche Canada, the Canadian Stroke Network and physicians across the country. Patient information is being collected prospectively and evaluated in a blinded fashion. Each centre has been asked to have study protocol approved by the local research ethics board. Demographics, stroke risk factors, blood pressure, biochemistry, hematology, and computed tomography (CT) scans are being collected. NIHSS and mRS scores are being collected. Outcomes will be monitored at discharge and at 3 months. **RESULTS:** 754 patients have been entered in the study to date. 45% of patients are independent (mRS 0–2) at 3 months and 29% have minimal or no neurological findings on examination (NIHSS 0–1). The rate of protocol violation is low at 12.5%. The rate of symptomatic intracerebral hemorrhage is 4.6% (95% CI 3.3–6.4). **CONCLUSIONS:** CASES is an ongoing prospective evaluation of the effectiveness of rtPA in acute stroke. The symptomatic hemorrhage rate is 4.6%. 90-day outcomes are commensurate with those observed in randomized trials.

Key words: stroke, tissue plasminogen activator, thrombolysis

037 Measures of the effectiveness of resident research curricula: a systematic review of the literature.

Frank JR, Bandiera G. Centre for Research in Education, University of Toronto, Toronto, Ontario.

BACKGROUND: There is increasing interest in developing the scholarly skills of residents. In Canada, the RCPSC has deemed “Scholar” one of 7 essential physician roles for Canadian specialty residency programs to incorporate. However no consensus exists on appropriate outcomes for measuring the effectiveness of resident research curricula. **OBJECTIVES:** To systematically assemble and characterize the outcome measures used to describe the effectiveness of resident research curricula. **METHODS:** We performed a search of the Medline, Healthstar, PsycLit, and ERIC databases from 1966 – July 2000 using the keywords: “resident”, “internship and residency”, and “research”. Additional resources were sought in bibliographies. The search was limited to English journal literature. Publications were included if they were descriptions or studies of resident research curricula that employed outcome measures of the program intervention. Citations were selected independently by each of us, and disagreements were resolved by consensus. Outcome measures were extracted and compared. **RESULTS:** The Medline search produced 71 citations. 6 additional citations were found using ERIC and bibliographies. Relevant studies and outcome measures used were selected and kappas calculated. The majority of studies involved family medicine residents in the U.S., and a variety of educational interventions. Studies employed traditional academic productivity measures in 63% and satisfaction scores in 57%. Ninety-three percent of papers were positive. **CONCLUSIONS:** There is heterogeneity in methods and outcomes used to measure the effectiveness of resident research curricula. No meta-analysis was possible. A consensus is needed to facilitate comparison of interventions and sharing of best practices.

Key words: systematic review, research, postgraduate training

038 Utility of developmental screening in the pediatric emergency department.

Millar KR, Graboski C, Fox M, Joubert GI. Department of Pediatrics, Section of Emergency Medicine, University of Western Ontario, London, Ontario.

OBJECTIVES: Early identification of developmental delay (DD) has

proven benefits to a child. Less than 30% of children with serious DD are identified prior to school entry. Children often utilize walk in clinic (WC) and emergency department (ED) services for primary care and may not be screened for DD. The Parents' Evaluation of Developmental Status (PEDS) is a parental self administered validated screening tool that has not been studied in the ED. Our objectives were to determine: the ED incidence of parental concern of DD, the proportion of unaddressed concerns, and to identify high risk ED subgroups. **METHODS:** The PEDS screening tool was administered in the ED to parents of children aged 2–8 yrs. We recorded the child's age, sex, diagnosis, number of visits to WC and ED over the past year, primary care doctor, PEDS score, whether DD concerns discussed with a doctor, and if not, why not, and had developmental assessment been done. Exclusion criteria: parents unable to read English or critically ill child. **RESULTS:** *n* was 413. 98.8% had a primary care doctor. 46.7% had concerns about their child's development — only 50.8% had discussed their concerns. DD risk frequency was high (HR) in 14.8%, moderate (MR) in 17.7%, and low in 67.6%. Concerns were not discussed in 28% of HR and 53% of MR patients. Developmental assessment had not been done in 39% of HR and 88% of MR patients. Risk of DD highly correlated with increase number of ED visits ($p = 0.0001$). Children with more ED visits were likely to screen at high risk (0–1 visits = 11%; >5 visits = 50% [$p < 0.001$]). DD risk did not correlate with age, diagnosis, or WC usage ($p > 0.057$). **CONCLUSIONS:** A high number of children at risk of DD were identified for the first time in the ED (13% of 413). Those at highest risk visited the ED the most. PEDS screening in the ED is easily administered and could identify unrecognized children with DD.

Key words: developmental delay, public health, pediatric

039 Do residents interpret pediatric chest radiographs accurately?

Alghamdi A, Lynch T, Gouin S, Larson C, Patenaude Y. University of Western Ontario, London, Ontario.

OBJECTIVES: The objective of this study was to evaluate the accuracy of pediatric chest radiograph interpretation by residents in emergency medicine and pediatrics compared to pediatric radiologists. **METHODS:** A consecutive sample of 18 chest radiographs performed for suspected pneumonia on children (1–8 years) who presented to an emergency department over a 3-day period was independently interpreted by 10 emergency medicine residents and 10 pediatric residents. Patients with chronic cardiorespiratory disease were excluded. Each resident was asked to indicate the presence or absence of pneumonia as defined by the presence of pulmonary opacities. Each resident was able to review the information on the original radiographic requisition but was blinded to the emergency department management and the radiologist's interpretation. The 18 radiographs were independently interpreted by 3 pediatric radiologists. Consensus agreement of at least 2 out of 3 radiologists was considered to be the gold standard. Kappa statistics assessed the level of agreement between the residents in each program and the radiologists. **RESULTS:** The level of agreement between the emergency residents and the radiologists was moderate (average kappa ± 1 SD = 0.47 ± 0.19). The average concordance rate between the emergency residents and the radiologists was good (average concordance rate ± 1 SD = $74 \% \pm 10 \%$). Similarly for the pediatric residents, the level of agreement was moderate (average kappa ± 1 SD = 0.50 ± 0.15) and the average concordance rate was good (average concordance rate ± 1 SD = $75 \% \pm 8 \%$). **CONCLUSIONS:** The level of agreement in the interpretation of pediatric chest radiographs by both residents in emergency medicine and pediatrics with pediatric

radiologists was moderate. Despite their lack of clinical evaluation, the accuracy of residents in both programs compared to pediatric radiologists was good.

Key words: radiography, postgraduate training

040 Emergency department revisits as a computer-automated quality assurance target.

Bullard M, Chui T, Lin C, Hu P, Liaw S. University of Alberta, Edmonton, Alberta.

OBJECTIVES: Quality assurance (QA) is often mandated by institutional accreditation leading to pressures on emergency departments (EDs) from administration to conduct QA. Unfortunately few if any resources are allocated to support these endeavours. Early ED revisits are potential markers of medical error or inadequate discharge and are targeted as an ED QA focus area. To efficiently use staff resources and establish a valuable QA process, an ED intranet was programmed to automatically alert the MD to repeat visits within 72 hours. Revisits were classified by the treating MD and later by blinded reviewers to identify complaints or diagnoses that would warrant nurse or physician education or departmental policy reviews. **METHODS:** During the 2-month study period, for any revisit within 72 hours, the computer generated mandatory screens required the physician to indicate the revisit reason (patient, medical, disease, system or unknown factor). These charts were later reviewed and classified by 2 independent reviewers with a 3rd MD adjudicator when needed. A random telephone sampling of all non-admitted patients was performed to determine ED revisits and a patient perceptions of reasons. **RESULTS:** There were 238 revisits (1.6%) for 14,690 patients over 2 months; 32% of revisits resulted in hospitalizations. The treating physician classified 81% of the revisits as patient and 10% as medical factors. The reviewers assessed revisits as resulting from patient (28%), 44% disease (44%), medical (23%), and system (2%) factors ($k = 0.76$). Among those classified as medical factors, 66% were admitted at the second visit. The most common chief complaints were abdominal pain (22%) and SOB (10%); while the most common diagnoses were gastroenteritis (13%) and cancer (9%). **CONCLUSIONS:** With 50% of revisits potentially preventable through improved medical care or education, computerized medical records have the potential to easily identify and track revisit events and contribute to QA projects.

Key words: quality, medical informatics

041 A comparison of emergency physician judgement versus a preliminary clinical model to predict severe urinary tract obstruction in renal colic.

Papa L, Stiell IG, Wells GA, Mahoney J. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: To compare the predictive accuracy of emergency physicians' judgement versus a recently developed clinical model for predicting severe urinary tract obstruction in patients with suspected renal colic. This is the first prospectively derived clinical model addressing the need for urgent imaging for severe urinary tract obstruction. **METHODS:** This prospective cohort study of suspected renal colic patients was conducted in 2 tertiary care hospital EDs staffed with certified ED physicians. Physicians evaluated patients prior to imaging and were asked to estimate patients' pretest probability of severe obstruction based on their clinical judgement on a scale from 0% to 100%. All IVP's were reviewed by a radiologist and a urologist to identify those cases with severe ureteral obstruction. The clinical model included 4 clinical variables: vomiting, rebound

tenderness, persistent pain in the ED despite IV narcotics and residual pain at discharge. Analysis of data included a comparison of the areas under the receiver operating characteristic (ROC) curves with 95% CIs. **RESULTS:** Of 115 patients evaluated over a 6-month period, 17 (15%) had severe obstruction. Physicians' median pretest probability of severe obstruction was 17% (95% confidence interval [CI] 14%–20%). The respective areas under the receiver operating characteristics (ROC) curve for predicting severe obstruction were physician judgement 0.64 (95% CI 0.51–0.77) and clinical model 0.89 (95% CI 0.74–1.03), ($p < 0.001$). Using a threshold of 10% predicted probability of severe obstruction, the respective indices of accuracy for physicians and the preliminary clinical model were sensitivity 53% vs. 90% and specificity 58% vs. 85%. **CONCLUSIONS:** Compared to physician judgement our preliminary clinical model for detecting severe obstruction is much more accurate. This clinical model should be prospectively validated and may prove quite useful for emergency physicians to use to determine the need for urgent imaging in cases of suspected renal colic.

Key words: renal colic, diagnosis

042 Non-contrast helical computed tomography versus intravenous pyelography for the investigation of suspected acute urolithiasis: a systematic review.

Worster A, Preya I, Hanies T. McMaster University, Hamilton, Ontario.

OBJECTIVES: In 1994, non-contrast helical computerized tomography (NHCT) of the abdomen was introduced as a method of investigating suspected acute urolithiasis. A number of studies report to varying degrees that NHCT is more accurate than other investigations in identifying patients with acute urolithiasis. Although the results of these studies are consistently in favour of NHCT, no formal review of the literature to confirm that NHCT is more accurate than IVP in this setting has been reported. **METHODS:** Computerized MEDLINE and hand searches for studies comparing NHCT and IVP in patients with suspected acute urolithiasis were conducted by 2 investigators in an independent and blind fashion. The results of each of the studies meeting the inclusion criteria were independently tabulated by hand by each investigator. The random effects pooled estimates of the positive and negative likelihood ratios with 95% confidence intervals were calculated along with the probabilities from calculated Z-tests and calculated Q-values for heterogeneity. **RESULTS:** No disagreement was found between the 2 investigators in terms of articles that met the inclusion criteria or between the results of the studies. Four studies involving a total of 296 patients met all of the a priori criteria. The positive likelihood ratios (LR+) for NHCT and IVP are 17.794 (6.901, 45.880) and 8.526 (4.157, 17.487) respectively. The negative likelihood ratios (LR-) for NHCT and IVP are 0.052 (0.028, 0.099) and 0.337 (0.205, 0.555) respectively. Heterogeneity between the four studies was significant in only one category, IVP LR- ($p < 0.001$). **CONCLUSIONS:** NHCT appears to have both a higher LR+ and lower LR- than IVP in the diagnosis of acute urolithiasis. The magnitude of these values has the potential to generate significant changes from pretest to posttest probability in the diagnosis of this disorder.

Key words: computerized tomography, renal colic, pyelography

043 How do physicians rate patients' pain after knowing patients' actual pain scores?

Papa L, Stiell IG, Wells GA, Mahoney J. University of Ottawa, Ottawa, Ontario.

OBJECTIVES: Little is known about the relative pain severity per-

ception of patients and physicians in cases of renal colic. This study compared the pain scale ratings of patients and treating emergency department (ED) physicians in cases of suspected renal colic. **METHODS:** We conducted a prospective cohort study of suspected renal colic patients at 2 tertiary care hospital EDs. A 10-cm visual analogue scale (VAS) was used to assess patients' pain on arrival to the ED. After initial patient assessment, the emergency physician was shown the patient's VAS score and was asked to record their impression of the patient's pain on another VAS. At discharge, patient's pain was again recorded on a VAS scale to assess treatment. Analysis included comparison of VAS scores with the Wilcoxon Signed Ranks Test. **RESULTS:** 169 patients with suspected renal colic were evaluated. Mean patient VAS score on arrival was 7.1 cm (95% CI 6.6–7.6) versus mean physician VAS score 6.2 cm (95% CI 5.7–6.7) ($p < 0.001$). Physicians agreed with patients in 22 (13%) cases, gave patients a higher score in 40 (24%) cases and gave patients a lower score in 107 (63%) cases. Only 5% of patients were felt by physicians to be exaggerating their pain. At discharge, patients' mean VAS score was 1.0 cm (95% CI 0.7–1.3) with over 50% of patients leaving the department in a pain free state and 77% leaving with pain less than 1 cm. **CONCLUSIONS:** Physicians often rated the admission pain intensity lower than did the suspected renal colic patients. Despite this, physicians rarely thought patients were exaggerating their pain and most patients left the ED in a pain-free state after adequate analgesia therapy. The role of rating pain intensity in cases of suspected renal colic should be further evaluated in future studies.

Key words: renal colic, analgesia, pain

044 Delayed ultrasound in patients with abdominal pain and/or vaginal bleeding in the first trimester of pregnancy.

Hendry JN, Naidoo Y. Waikato Hospital, Hamilton, New Zealand.

OBJECTIVES: In patients with abdominal pain and/or vaginal bleeding in the first trimester of pregnancy ruling out ectopic pregnancy is essential. Clinical exam alone cannot rule out ectopic. The literature suggests that emergent ultrasound is required for appropriate diagnosis and disposition. In reality this is often unavailable. We theorized that a simple clinical decision rule could predict the safety of delayed outpatient ultrasound in these patients. **METHODS:** Ectopic pregnancies over a two-year period were retrospectively reviewed for clinical status at first presentation. Before data extraction "Clinically Stable" low risk patients were arbitrarily defined by the following characteristics; 1) systolic blood pressure greater than 100, 2) heart rate less than 100, 3) no risk factors for ectopic pregnancy, 4) no findings of peritonism, cervical excitation, adnexal mass or tenderness. During the study period emergent ultrasound was generally only available for patients with high clinical suspicion of ectopic pregnancy. In those patients meeting the definition of clinical stability time delay to ultrasound and whether any adverse events occurred during this delay was determined. **RESULTS:** One hundred seventeen cases of ectopic pregnancy were reviewed. Thirty-seven met the definition of clinical stability. These patients waited a median of 14 hours for ultrasound with 62% waiting more than 12 hours. No adverse events occurred. The risk of adverse events using this strategy is less than 3% however confidence intervals (CIs) are wide (95% CI 0%–14%). **CONCLUSIONS:** Preliminary results suggest that pregnant patients with abdominal pain and/or vaginal bleeding in the first trimester who meet low risk clinical criteria may have ultrasound delayed 12–8 hours without risk of adverse events. Further prospective studies are warranted to confirm the safety of this strategy.

Key words: ectopic pregnancy, diagnosis