Canada: Administration

034 AN APPLICATION OF A MODEL DETERMINING EMERGENCY DEPARTMENT WORKLOAD AND STAFFING

A. Affleck, M. Murray. *197 Chercover Drive, Thunder Bay, Ontario, Canada P7G 1A6*

Introduction: The ability to determine the physician workload in an individual Emergency Department (ED) would enable one to calculate the hours of coverage an ED requires and estimate the number of full time physicians required to staff the ED. Furthermore such a model could be applied for remuneration of physicians. Different formulas have been used to calculate the number of physicians required to staff an ED. Some departments base coverage on 5,000 patient visits per full time equivalent or use a patient per hour estimate such as 2.5 patients per hour per physician. These estimates do not allow for variations in acuity or volumes and provide a very rough and somewhat inaccurate estimate of the hours of physician coverage. This paper looks at the success of applying a workload model to physician coverage and applying it to physician funding.

Methods: A model for determining physician workload was developed by Dr. Michael Murray based upon two components: The Canadian Triage and Acuity Scale (as developed by the Canadian Association of Emergency Physicians) and patient volume. The average time required to fully assess, treat and enact a disposition plan of a patient in each of the five triage levels was generated from a limited number of time studies relating to triage levels. The model incorporates a midnight factor to allow for the decreased patient visits over the midnight hours. The model uses the patient volume, the fraction of patients in each triage level and the average time per patient in each triage level to calculate the ED workload. This is applied to the yearly volume and the midnight factor is added in to give the number of hours of physician coverage per year.

035 CASINO SHIFT-SCHEDULING IN THE EMERGENCY DEPARTMENT: A STRATEGY FOR ABOLISHING THE NIGHT-SHIFT?

P. Croskerry MD, D. Sinclair. *Department of Emergency Medicine, Dalhousie University, Queen Elizabeth II Health Sciences Centre, 1796 Summer St., Halifax, Nova Scotia, B3H 3A7, Canada*

Introduction: Shift-work is an undesirable but necessary feature of a career in Emergency Medicine (EM). Rotating shift-work is known to have significant deleterious effects on quality of life and physician well-being. There is also well-documented evidence of adverse effects on several parameters of health, including a possible reduction in life expectancy. Importantly, cognitive fatigue associated with circadian rhythm disruption is known to lead to errors. In order to sustain a career in EM, and for improved patient safety, strategies must be found for reducing its negative impact. The principal factor responsible for these adverse effects is disruption of the circadian rhythm. This results from loss of sleep during the *anchor period* (around 0200–0600hrs). Thus, if some significant fraction of sleep can be preserved during this period, the circadian rhythm will likewise be preserved to some extent. For many years, casinos around the world appear to have accomplished this by shift-changing at 0400 hrs.

Method: The scheduling of night-shifts in a busy ED was changed from double-coverage (2 emergency physicians (EPs) from 2300–0700) to a mixed overlapping shift where EPs worked either the casino shift 1900–0400hrs, or a regular shift (2300–0700 hrs.), both counting as 'night shifts'. Full-time EPs worked 4 night-shifts per month, and part-time 1–3. The new schedule allowed a comparison of the regular shift with the casino shift. Two years after the change, physicians were surveyed for their perceptions and opinions.

Results: Fifteen EPs were surveyed, comprising 13 males and 2 females, who worked the combination of shifts. Although the casino shift was longer by 1 hour, 87% of EPs preferred it; the family of the shift-worker also demonstrated a similar although less marked preference (63%). Following the regular shift, EPs slept 25% less (4.5 hrs.) compared with when they worked the casino shift (6 hrs.). Perceived recovery time from the casino shift was significantly shorter (1.2 days) than the regular shift (2.1days). Perceived cognitive impairment over the last 4 hours of each shift was significantly less in the casino shift (18 %) compared with the regular shift (31 %).

Conclusions: These results showed that the casino shift was preferred by emergency physicians and, to a lesser extent, by their families. Physiological benefits from casino scheduling (more sleep, perceived shortened recovery time and a perceived reduction in cognitive impairment) would be expected to benefit clinical performance and reduce error. A full casino schedule would require 3 shifts (e.g.1200–2000, 2000–0400, 0400–1200) for 24 hours. The true test of casino scheduling would be to see how a 0400–1200hrs shift would be accepted. Several physicians supported such a shift, and abandonment of the traditional overnight shift (2300–0700 hrs.) altogether. This preliminary study shows potential benefits of casino shift scheduling in the ED.

036 COGNITIVE FORCING STRATEGIES IN EMERGENCY MEDICINE

P. Croskerry. *Department of Emergency Medicine, Dalhousie University, Queen Elizabeth II Health Sciences Centre, 1796 Summer Street, Halifax, Nova Scotia B3H 3A7*

Introduction: The intrinsic operating characteristics of emergency departments (ED) predispose them to medical error. Many errors occur in clinical decision making, resulting in delayed or missed diagnoses, and are associated with an increased severity of adverse outcomes. They originate from a defined subset of predictable cognitive errors, many of which are preventable. Historically, no formal approach has existed for recognizing and aborting such errors.

Methods: A novel approach is described here, derived from the psychological education theory of metacognition. Firstly, medical students and residents were given an introduction to basic error theory, the clinical characteristics of cognitive errors, and the metacognitive approach to clinical decision making. Using clinical cases, the concept of a *cognitive forcing strategy* (CFS) was then introduced and its application demonstrated for genotypic and phenotypic classes of error typically encountered in the ED. Thus, a formal approach for the minimization or avoidance of error in clinical decision making was demonstrated.

Results: Evaluation of the course by Emergency Medicine and Pediatric residents revealed an overwhelming support for this approach. Medical undergraduates, anonymously surveyed to evaluate the efficacy and relevance of this course among the traditional courses in Clinical Clerkship training, gave approval ratings as follows: (1) *Content was useful* (92%); (2) *Answered questions on this topic* (76%); (3) *Appropriate presentation format* (98%), and (4) *Presenter appropriate for this topic* (82%). Course length (2 hours) was rated as appropriate by 70%; overall ranking on a 10 point scale from 1 (poor) to 10 (excellent) was 7.6. Longer term evaluation is planned to assess the retention of the CFS technique into residency training.

Conclusions: This technique offers a structured, formal approach to the avoidance of cognitive error in clinical decision making. It receives significant support and approval from undergraduates and residents. Despite the novelty of this area in undergraduate training, there was almost unanimous recognition and acceptance of its utility.

037 NO ROOM AT THE INN: EMERGENCY DEPARTMENT OVERCROWDING IN ONTARIO, CANADA

A.J. Drummond. *20 Drummond Street West, Perth, Ontario, Canada, K7H 2J5*

Emergency department overcrowding is considered to be a significant public health problem in Canada, which has garnered widespread negative press coverage and placed significant pressure on governments to address the problem. Ontario is Canada's most populated province with ten million residents and 180 emergency departments. As with all jurisdictions in Canada, Ontario has been struggling to fund a universal health care system and this has led to attempts to reduce costs by widespread hospital restructuring. This has resulted in the closing of some hospitals, the rationalization of emergency services in some communities and an overall 20% reduction in acute care hospital beds. Ontario hospitals are now expected to function at 90–95% bed occupancy. The Ontario government has found it convenient to promote the myth that overcrowding is due to an excessive influx of patients to the ED with minor illness as opposed to a problem of efflux of admitted patients with no hospital beds to be transferred to. This has led to initiatives aimed at keeping patients from seeking care in the emergency department. The Ontario government in 2000–2001 initiated a universal influenza vaccination campaign and established a universally accessible telephone consultation service. The government is also attempting to fast-track primary care reform. The role of inadequate in-patient beds, or the efflux component

of the equation, has largely been ignored. In December of 2000, both the Canadian Association of Emergency physicians and the Section on Emergency Medicine of the Ontario Medical Association simultaneously released distinct position statements on the root causes of and potential solutions for emergency department overcrowding. It is our common belief that there must be a factual basis for health care initiatives aimed at eliminating ED overcrowding. In this presentation, both documents will be reviewed.

038 INCREASED EMERGENCY DEPARTMENT VOLUMES BUT DECREASED OVERALL UTILIZATION: ONTARIO'S HOSPITAL RESTRUCTURING PARADOX

M.J. Schull, B.T.B. Chan, S.E. Schultz. *Institute for Clinical Evaluative Sciences, Room G-106, 2075 Bayview Avenue, Toronto, Ontario, Canada, M4N 3M5*

Introduction: The hospital system in Ontario underwent substantial restructuring in the 1990s. We sought to compare the number of emergency departments (ED) in the province with the total number of ED visits during this period.

Methods: Over the study period (fiscal years 1993 to 2000), most ED physician services were paid for on a fee-for-service (FFS) basis. We obtained data on all FFS physician billing records for ED patient visits in Ontario. EDs where physicians' services were not continuously remunerated by FFS were excluded. To confirm ED status, billing data was supplemented by surveys of District Health Councils (DHC), and telephone calls to individual hospitals. Limited service EDs were defined as those limiting patient visits or ambulance arrivals to <24 hours/day. Statistical tests were not conducted since we included virtually the entire ED patient population.

Results: In 1993, there were 201 EDs in Ontario. By 2000, 20 (9.5%) had closed, 7 (3.5%) had reduced services and 0 had opened, leaving 181 full or limited service EDs. Across the 17 regional DHCs, the proportion of EDs that closed ranged from 0% (0 of 19) to 36% (4 of 11). Over the same period, the population of Ontario increased by 8.9%, but the overall per capita ED visit rate declined by 10.3%; these trends resulted in a decrease in the total number of ED visits of 2.2% (from 3.34 to 3.27 million visits). As a result, the average number of visits per ED rose by 10%, from 19111 visits per ED in 1993 to 21096 visits per ED in 2000.

Conclusion: As a result of ED closures, the average ED in Ontario had a substantially higher visit volume in 2000 than in 1993, despite reduced overall utilization. Planners should consider these trends when trying to predict future demand for ED services.

Critical care/airway/ anaesthesia/analgesia

039 TESTING THE VALIDITY OF AN ASSESSMENT PROCESS FOR AIRWAY MANAGEMENT SKILLS

R. McGraw, L. Shulha. *Kingston General Hospital, 76 Stuart Street, Kingston, Ontario, Canada, K7L 2V7*

Introduction: The purpose of this study was to develop a reliable and valid assessment process for the technical skills of airway management that could be used as a station in an Objective Structured Clinical Examination(OSCE).

Methods: To obtain evidence for the validity of the assessment process a study was performed to determine whether scores on the OSCE would discriminate between the performances of groups of inexperienced and experienced students. A multiple regression analysis was done to determine the extent to which scores on the OSCE were influenced by level of medical education and airway management knowledge. Finally, the interobserver reliability of paired examiners for a global rating of competency was assessed.

Results: The mean OSCE score for the inexperienced group was 12.5 (N=21) and for the experienced group was 17.2 (N=17), for a mean difference of 4.7 ($p< .001$). The multiple regression analysis, using OSCE score as the dependent variable, and score on a test of airway management knowledge and level of experience as the independent variables, generated an R^2 value of 0.57 ($p<.001$). The interobserver reliability of examiners on the global rating was high with Kappa values of 1.0, 1.0, 1.0 and 0.82 for the four examiner pairs.

Conclusion: An assessment process has been developed that can be used to measure the competence of senior medical students and junior postgraduate students in the technical skills of airway management. The interobserver reliability of the process appears to be quite high amongst emergency physicians and anesthetists.

Medicine

040 EMERGENCY DEPARTMENT TREATMENT OF STABLE ACUTE PAROXYSMAL ATRIAL FIBRILLATION

A.K. Kapur, I.G. Stiell, G.A. Wells, R.J. Brison, M. Mortensen. *Clinical Epidemiology Unit, F6, Ottawa Hospital, Civic Campus, 1053 Carling Avenue, Ottawa, Ontario K1Y 4E9, Canada*

Objectives: The optimal management of acute paroxysmal atrial fibrillation (PAF), a common ED presenting complaint, remains undetermined. This study's purpose was to compare immediate and short-term outcomes of aggressive (AGG) and conservative (CON) ED treatment of clinically stable PAF.

Methods: This 6-month prospective cohort study, conducted at 3 university-affiliated hospital EDs, enrolled all adult patients with <48 hours of clinically stable PAF. CON patients received no treatment or only rate control agents. AGG patients had pharmacologic and/or electrical cardioversion attempted. Patients were telephoned at four weeks to determine PAF recurrence, complications, and quality of life using the SF-36 scale. Proportions of the AGG and CON groups in sinus rhythm at ED discharge and at follow-up, as well as complications in the ED and at four weeks, were compared using chi-square. Quality of life was compared using t-test.

Results: We enrolled 169 patients, 32 in the CON group and 137 in the AGG group. The CON group was slightly older (mean 70.3 vs 61.9 yrs, p=0.001) and more had coronary artery disease (78.9% vs 42.6%, p<0.01). More AGG patients cardioverted to sinus rhythm in the ED (82.5% vs 34.4%, p<0.001) and fewer were admitted (8.0% vs 37.5%, p<0.001). Fifteen (8.9%) patients, all AGG, had complications in the ED; two (1.2%) required admission. 97.0% of patients were followed up. More AGG patients cardioverted and stayed in sinus rhythm for four weeks (52.3% vs 30.0%, p=0.03). AGG patients had higher physical summary scores on the SF-36 at four weeks (47.1 vs 41.2, p=0.01). No thromboembolisms occurred by four-week follow-up.

Conclusions: This is the first study to prospectively follow PAF patients treated in the ED. Aggressive treatment for PAF is as safe as conservative and more successful for restoring sinus rhythm in the ED and should be considered the optimal ED management of PAF.

041 SUCCESS AND COMPLICATIONS OF INDIVIDUAL TREATMENT METHODSFOR PAROXYSMAL ATRIAL FIBRILLATION

A.K. Kapur, I.G. Stiell, G.A. Wells, R.J. Brison, M. Mortensen. *Clinical Epidemiology Unit, F6, Ottawa Hospital, Civic Campus, 1053 Carling Avenue, Ottawa, Ontario K1Y 4E9, Canada*

Objectives: To compare the proportion of paroxysmal atrial fibrillation (PAF) patients who convert to sinus rhythm in the ED with rate control agents (RC), pharmacologic agents (PHARM) or electrical cardioversion (ELEC). To determine the proportion of patients in each group who suffer complications in the ED.

Methods: This 6-month prospective cohort study, conducted at three university-affiliated hospital EDs, enrolled all adult patients who presented to the ED with <48 hours of clinically stable PAF. Success was determined by the ED physician's interpretation of the ECG. Complications were determined by review of the patient's ED chart and vital signs. Proportions, with 95% confidence intervals (CI), were compared using chi-square. RESULTS: We enrolled 169 patients; 81 in the RC group, 127 PHARM, 57 ELEC, and 12 received no treatment (some patients received more than one treatment). 7 of the untreated patients (58.3%, CI:32.0%-80.7%) and 4 RC patients (4.9%, CI:1.9%-12.0%) spontaneously converted. 65 PHARM patients (51.2%, CI:42.6%-59.7%) and 50 ELEC patients cardioverted (87.7%, CI:76.8%-93.9%). None of the untreated patients had complications (0.0%, CI:0.0%-24.3%). 2 RC patients had complications (2.5%, CI:0.7%-8.6%). 4 PHARM patients had complications (3.1%, CI:1.2%-7.8%) and one of them was admitted (0.8%, CI:0.1%-4.3%). 9 ELEC patients had complications (15.8%, CI:8.5%-27.4%) and one of them was admitted (1.8%, CI:0.3%-9.3%). Electrical cardioversion was less successful if preceded by rate control (73.9% vs 97.1%,

p=0.01). Pharmacologic conversion was also less successful if preceded by rate control (47.5% vs 54.4%) but this was not significant (p=0.43).

Conclusions: Electrical cardioversion was the most successful treatment method. Administration of rate control agents decreased the success of the other treatment methods. Most complications were minor and did not lead to admission. This suggests that primary electrical cardioversion is the optimal ED treatment for PAF.

Trauma

042 PREDICTIVE FACTORS OF FRACTURES IN PATIENT WITH CLINICAL ANTERIOR SHOULDER DISLOCATION

M. Emond, N. Le Sage, L. Rochette[1]. *Emergency Medicine Division, Family Medicine Department, Laval University; [1]St-Augustin Research Center, Quebec City, Canada*

Study objective: To determine risk factors of fracture among patient with an anterior shoulder dislocation seen in an emergency department (ED).

Methods: A retrospective case-control study was conducted at a university-affiliated ED. We reviewed charts of consecutive patients with an anterior shoulder dislocation over a five year period. Patient seen in the ED were included if they were > 18 years old and had a post-reduction radiological report. Clinical data that could predict the presence of fracture were extracted. We compared profile of patients having a fracture (cases) to those having a dislocation only (controls).

Results: Four hundred and sixty-two (462) patients were included in our study. All charts were reviewed and 128 had a fracture-dislocation (27,7%), while the remaining 334 had a dislocation (72,3%) . Of all the patients, 38,5 % had at least one previous episode of shoulder dislocation. Multiple variables were assessed using variance analysis to identify significant factors and a logistic regression model was then constructed. The following factors : 1) age >50 years old, 2) an trauma history including either a fall more than one floor high or a fight/direct blow episode or a motor vehicule accident and 3) a first episode of dislocation were all positively associated (p<0,001) with the presence of fracture-dislocation. Their respective odd ratios (OR) and 95 % confidence intervals were 3,49 (2,16 ; 5,63), 2,27 (1,35 ; 3,83) et 4,30 (2,34 ; 7,89). Using those factors to identify all types of fracture, we constructed a model that reached a sensibility of 86,7%, a specificity of 36,5 % and negative predictive value (NPV) of 87,6%.

Conclusion: Physician facing a clinical evident anterior shoulder dislocation could use those predictive factors to identify patient more at risk of fracture-dislocation. A better management may accelerate patient care while diminishing cost and exposure to x-ray. Prospective validation of those predictive factors is suggested.

043 MULTICENTRE PROSPECTIVE VALIDATION OF THE CANADIAN C-SPINE RULE

I.G. Stiell, C. Clement, G.A. Wells, R.D. McKnight, R. Brison, J.R. Worthington, M. Schull, M. Eisenhauer, B. Rowe, I. MacPhail, D. Cass, H. Lesiuk, for the CCC Study Group. *Clinical Epidemiology Unit, F6, Ottawa Hospital, Civic Campus, 1053 Carling Avenue, Ottawa, Ontario, K1Y 4E9 Canada*

Objectives: The Canadian C-Spine Rule (CCR) for radiography in alert and stable trauma patients was previously derived in a cohort of 8,924 patients. The CCR calls for evaluation of active neck rotation if patients have none of 3 high-risk criteria and at least 1 of 5 low-risk criteria. This study prospectively and explicitly evaluated the accuracy, reliability, and acceptability of the CCR.

Methods: This prospective cohort study was conducted in 9 tertiary care Eds and involved alert (GCS 15) and stable adult trauma patients at risk for neck injury. More than 350 physicians completed 15-item data forms and interpreted the CCR status for all patients who then underwent radiography to determine the outcome, clinically important c-spine injury. Some patients were independently examined by a 2nd MD. Patients were followed by a 14-day telephone interview. Analyses included sensitivity, specificity, kappa coefficient, and descriptive statistics, with 95% Cis.

Results: The 7,017 patients enrolled over 30 months had these characteristics: mean age 37.5 (range 16–100), male 52.7%, ambulance arrival 62.6%, clinically important c-spine injury 2.0%, unimportant injury 0.5%, internal fixation 0.6%, halo 0.6%. The CCR classified patients for 140 important injuries with sensitivity 99.3% (95% CI 96–100), specificity 40.4% (39–42), and would have required radiography for 49.9%. The kappa value for MD interpretation of the CCR was 0.66 (0.52–0.81). MDs misclassified the rule in 8.7% of cases, did not evaluate range of motion when indicated in 10.5%, and were comfortable applying the rule in 92.2%. The single case not identified was an ambulatory male without midline tenderness, whose initial radiographs were normal, and who was eventually treated with a hard collar.

Conclusions: The CCR has proven to be an accurate, reliable, and acceptable decision rule. Widespread implementation would lead to more efficient use of immobilization procedures and radiography for alert and stable trauma patients.

Paediatrics

044 COMPARISON OF PLASMA LEVELS AND PHARMACODYNAMICS AFTER INTRAOSSEOUS AND INTRAVENOUS ADMINISTRATION OF FOSPHENYTOIN AND PHENYTOIN IN PIGLETS

N. Kissoon, T. Khan. *820 Prudential Drive, Suite 203, Jacksonville, FL 32207*

Introduction: Difficulty in achieving therapeutic drug levels via the IO route may be due to failure to standardize drugs and flush solutions. We compared drug levels and pharmacodynamics in standard doses of fosphenytoin and phenytoin given via the intraosseous and intravenous route.

Methods: Piglets (30–40kg) were anesthetized, intubated, instrumented and mechanically ventilated. A peripheral intravenous line and intraosseous needle (15 gauge Sur Fast™ Cook Inc.) was inserted for drug infusions. Forty animals (10 per group) were randomly assigned for intravenous and intraosseous phenytoin and fosphenytoin infusions. Phenytoin (20mg/kg) was infused over 20 minutes and fosphenytoin (20mg PE/kg) over 7 minutes. All infusions were followed by 5ml normal saline flush (as done clinically). Blood samples (3 mls) for drug levels were then drawn before infusion (base line) and at 0, 5, 10, 15, 20, 30, 40, 50, 60 and 75 minutes following infusion. Repeated measures Analysis of variance (ANOVA) was used to evaluate statistical significance (p<.05).

Results: Phenytoin levels were undetected at base line. Free (10–20 mcg/ml) and total (80–110 mcg/ml) were well above therapeutic range (free 1–2mcg/ml and total 10–20 mcg/ml) post infusion in fosphenytoin groups as compared to phenytoin. From 20–75 minutes, all groups had free and total levels within therapeutic range. Significant differences in values were seen in free phenytoin at 0–10 minutes (p<0.05) and total phenytoin at 0–20 minutes (p<0.05) between intraosseous phenytoin and fosphenytoin. Similarly, differences were also seen when intravenous phenytoin and fosphenytoin groups were compared.

Conclusion: There is no need to adjust standard drug doses of phenytoin when given via the intraosseous route if followed by adequate flush of 5ml. The initial high levels of phenytoin in the fosphenytoin groups are of concern since neurological toxic effects may occur at these levels. Slower infusion rates may be needed for fosphenytoin to avoid toxic levels.

Toxicology

045 EFFECT OF ANTICHOLINERGIC DRUGS ON THE EFFICACY OF ACTIVATED CHARCOAL

R. Green, M. Tenenbein, D.S. Sitar. *Critical Care, Health Sciences Centre,GE 706, 820 Sherbrook Street, Winnipeg, Manitoba, Canada, R3A 1R9*

Background: Although it is a commonly held tenet that the ingestion of drugs with an anticholinergic action would prolong the duration of time after drug ingestion for effective gastric decontamination, there are no published data that support this belief. The purpose of this study was to determine whether activated charcoal is more effective in the presence of anticholinergic activity.

Methods: This was an IRB approved, human volunteer, randomized crossover study. Ten volunteers ingested 4.0 g of acetaminophen on three occasions at least one week apart. One

ingestion served as a control. One hour after the other two ingestions each volunteer ingested 50 g of activated charcoal in water. These two limbs differed in that each volunteer received 0.01 mg/kg of atropine intramuscularly 15 minutes prior to acetaminophen dosing in one of them. Eight blood specimens were obtained over the initial 8 hours for serum acetaminophen concentrations (HPLC) which were used for calculation of routine pharmacokinetic parameters. Repeated measures ANOVA and Tukey's HSD test were used for statistical analysis.

Results: Pharmacokinetic parameters for acetaminophen in our volunteers were consistent with literature values. The mean AUC + SD for the control, charcoal and atropine/charcoal groups were 258+122, 206+120, and 138+88 mg/L.hr, respectively. The decreases of bioavailability were 20% for the charcoal and 47% for the atropine/charcoal groups. Charcoal was more effective when the subjects were pre-treated with atropine compared to charcoal without atropinization ($p<0.05$).

Conclusion: Our data support the belief that activated charcoal is more effective in the presence of anticholinergic activity.

046 HOW LONG DRUG INGESTION IS ACTIVATED CHARCOAL STILL EFFECTIVE?

R. Green, R. Grierson, D.S. Sitar, M.Tenenbein. *Critical Care, Health Sciences Centre, GE 706, 820 Sherbrook Street, Winnipeg, Manitoba, Canada, R3A 1R9*

Objective: The recent American Academy of Clinical Toxicologists/European Association of Poisons Centres and Clinical Toxicologists position statement on activated charcoal stated "there are insufficient data to support or exclude its use after 1 hour of ingestion." The purpose of this study was to determine the effectiveness of activated charcoal administered 1, 2, and 3 hours after drug ingestion.

Method: This was a human volunteer, randomized crossover study. Ten volunteers ingested 4 grams of acetaminophen on four occasions at least 1 week apart. One ingestion served as a control and the other three as experimental ingestions with charcoal being administered at 1, 2, and 3 hours after acetaminophen dosing. Eight blood specimens were obtained over the initial 8 hours for acetaminophen concentrations that were used for calculation of routine pharmacokinetic parameters. Repeated measures ANOVA and Tukey's HSD test were used for statistical analysis.

Results: Pharmacokinetic parameters for acetaminophen in our volunteers were consistent with literature values. The mean area under the curve (AUC+SD) for the control and the 1-, 2-, and 3-hour groups were 221+54, 154+71, 206+67, and 204+58 mg/L/hr, respectively. The 1-hour group was the only one differing form the control ($p<0.01$). The decreased bioavailibility at 1 hour was 30.3%, which is similar to previous studies.

Conclusion: Our data do not support the administration of activated charcoal as a gastrointestinal decontamination strategy beyond 1 hour after drug overdose.

047 SERUM α-GLUTATHIONE S-TRANSFERASE (αGST) BECOMES ELEVATED SHORTLY AFTER SUBTOXIC ACETAMINOPHEN OVERDOSE

M.L.A. Sivilotti, S.B. Bird, M. Montalvo, C.K. Aaron, R.J. Brison, C.H. Linden. *Department of Emergency Medicine, Queen's University, Kingston, Canada*

Introduction: αGST is a promising new biomarker of end-organ toxicity following acetaminophen (APAP) overdose. Unlike traditional liver function tests, αGST appears in the serum shortly after overdose in patients who fall above the Rumack-Matthew nomogram threshold for initiating *N*-acetylcysteine (*N*-AC). The serum αGST profile following lesser ingestions of APAP in humans is unknown. We sought to quantify the early αGST response following subtoxic exposures to APAP.

Methods: Prospective, observational pilot study of patients presenting within 4 hours of a single acute APAP overdose, with a 4-hour serum APAP level of 500–1000 μmol/L (i.e. below but within 50% of the nomogram threshold). Levels were measured q2h until 10 hours post ingestion.

Results: 8 patients (median age 18 years, range 15–59; 2 male) were studied. 4-hour APAP levels were (mean±sd) 815±212 μmol/L, and all patients were considered low-risk by conventional criteria. Despite persistently normal serum AST and ALT in all patients, four had serum αGST levels above the 95%ile upper limit of normal (peak 13, 30, 72, and 79 μg/L; normal <7.5 μg/L). Three of these patients had elevated αGST at presentation, and levels had normalized by 10 hours (in the absence of *N*-AC therapy) in two of these three.

Conclusions: αGST appears in the serum shortly after APAP exposure in patients falling below the "possible hepatotoxicity" nomogram zone. Small elevations in αGST may represent reversible, subclinical injury to vulnerable centrilobular hepatocytes. This phenomenon suggests end-organ toxicity occur even during the classically taught 8-hour window of adequate glutathione protection. This biomarker deserves further study, given its potential to help risk-stratify patients in whom the nomogram cannot be applied (uncertain time of ingestion, repetitive dosing), and to reduce unnecessary or prolonged antidotal treatment with *N*-AC.

048 SERUM α-GLUTATHIONE S-TRANSFERASE FOLLOWING SUPRATHERAPEUTIC DOSING OF ACETAMINOPHEN IN HUMAN VOLUNTEERS

M.L.A. Sivilotti, M. Montalvo, R.J. Brison, C.H. Linden. *Department of Emergency Medicine, Queen's University, Kingston, Canada*

Introduction: α-Glutathione S-transferase (αGST) is a promising new biomarker of end-organ toxicity following acetaminophen (paracetamol, APAP) overdose. Understanding the temporal dose-response profile of serum αGST release is necessary prior to clinical application of this biomarker, and to explore its potential as a surrogate outcome for interventional studies in humans. We sought to characterize the early response of serum αGST following a single supratherapeutic dose of APAP in healthy subjects.

Methods: Prospective human volunteer study. Fasting subjects received 100 mg/kg liquid APAP, and serum was collected every 2 hours until 10 hours for APAP, AST, ALT, bilirubin and αGST concentrations. Patients with known risk factors for APAP hepatotoxicity were excluded.

Results: 24 healthy subjects (age 18–42; 13 male) achieved serum APAP levels of (mean±sd) 347±65 μmol/L (4h), and 93±53 μmol/L (10h). AST and ALT remained unchanged (final-initial AST -11±18, ALT -2.0±3.1 IU/L). On average, αGST levels did not change substantially (average peak-baseline 2.6±6.3 μg/L). Two subjects, however, were clear outliers ("responders") with substantial increases in αGST (final 35 and 14.5 μg/L vs initial 7.5 and 0.5 μg/L, respectively), despite unchanged serum transaminse concentrations (final-initial AST +2 and +9, ALT –5 and +6 IU/L).

Conclusions: Serum αGST is unlikely to rise appreciably following supratherapeutic but subtoxic ingestions in healthy subjects, supporting its use as an early "rule out" marker in the overdose setting. Moreover, the ability to demonstrate a response in αGST in a small subset of subjects suggests a model to screen patients for vulnerability to APAP-induced hepatic injury. This biomarker might ultimately improve the specificity and dosing of *N*-AC therapy, and may help resolve controversy regarding risk factors (e.g. alcoholism) for hepatic injury following APAP exposure.

Pre-hospital: EMS

049 THE SAFETY OF MORPHINE IN THE PREHOSPITAL CARE SETTING

A. Affleck, D. Benedict. *197 Chercover Drive, Thunder Bay, Ontario, Canada, P7G 1A6*

Introduction: Morphine has been used in pre-hospital care primarily for pain relief as effective analgesia is essential in pre-hospital care particularly where long transport times exist. The safety and adverse effects of morphine in pre-hospital care has not determined. The need for concurrent administration of an anti-emetic and concerns of hypotension have the potential to limit its use in an EMS system that has a limited scope of practice.

Methods: A prospective study was undertaken from January 1999 to September 2001. All Advanced Care Paramedics were in-serviced on the study and were directed to document any adverse effects noted with the administration of IV morphine. Morphine was administered under standing orders for fractures/possible fracture and for chest pain. On line medical orders were obtained when morphine was required for other reasons. The Ambulance Call Reports(ACR's) of all calls where morphine was administered were reviewed. The primary complaint, age, gender, dose, blood pressure before and after administration and adverse effects were recorded. At the end of the

study a review was undertaken with all of the paramedics to ensure all significant events were captured.

Results: During the study period morphine was administered 217 times. The most common primary complaint was fracture/possible fracture(120) followed by other(52) and chest pain(24). In the other category morphine was given for back pain, abdominal pain and burns. Males received morphine more often than females(116:101) with the average age being 56. The average dose of morphine was 5.5mg with the range being 1 to 20 mg.. Hypotension, defined as a systolic blood pressure less than 100, occurred in 4 patients with the greatest fall in systolic blood pressure being 72. Nausea was reported in 4 patients and there were no episodes of vomiting. No other side effects were noted.

Conclusions: Morphine was administered for a wide variety of conditions and proved to be safe. With hypotension occurring in less than 2% of patients. No other serious adverse effects were noted. The incidence of nausea was minimal and vomiting did not occur. Morphine appears to be safe to use in the pre-hospital care setting and the need to carry an anti-emetic for concurrent administration with morphine is not required.

050 THE RELIABILITY OF THE CANADIAN EMERGENCY DEPARTMENT TRIAGE AND ACUITY SCALE IN THE PREHOSPITAL

M.J. Murray, S. Bondy. *RR#2 Phelpston ON Canada L0L 2K0*

Setting: Interrater Agreement between Paramedics and Nurses.

Study objective: To determine the rate of interobserver reliability of the Canadian Triage and Acuity Scale (CTAS) between paramedics and emergency department triage nurses.

Methods: Two hundred and ten paramedics were trained on the use of the CTAS in an 8-hour didactic course. They applied the scale to every patient transferred to the 7 area hospital emergency departments participating during the 4-week study period. The paramedic CTAS assignment was done on arrival to hospital and compared to the triage nurse on arrival in the ED. The triage nurse score was taken as the gold standard. Scores were not revealed by the paramedic or the RN. The rate of agreement was determined between the groups of raters using κ statistics and overall correlation using Pearson's rho.

Results: There were 1636 patients transferred to hospital during the study period. Of those 1437 had CTAS scores assigned by both the paramedic on arrival and by the triage nurse in the ED. The distribution of CTAS scores and mean scores were the same for both groups of raters. The probability of agreement between the two observers on a given patient was 0.599 and the overall agreement within one level was 96%. Overall correlation (using Pearson's rho) between the two scores was 0.62 (95%CI 0.59 to 0.65). The overall chance corrected agreement κ using quadratic weights was 0.61 (95% CI 0.56 to 0.66). Further analysis showed meaningful differences between hospitals in terms of degree of agreement. Observed levels of agreement from one centre to another showed the overall correlation between the two sets of raters ranging from a high of 0.70 to a low of 0.47.

Conclusions: The observed rate of agreement between the two raters was significantly greater than by chance alone and consistently in the moderate to substantial range. This suggests that paramedics understand and can apply the CTAS scale to patients similar to nurses

051 TRAINING BLS PARAMEDICS IN THE USE OF THE LARYNGEAL MASK AIRWAY IN CARDIAC ARREST USING A CLASSROOM MANIKIN MODEL

M.J. Murray, L. Morrison, M. Vermeulen. *RR#2 Phelpston ON Canada L0L 2K0*

Introduction: The purpose of this study was to determine if a classroom mannequin training method for teaching Laryngeal Mask Airway insertion translated into successful use in adult out of hospital cardiac arrest patients by basic level paramedics.

Methods: All pre hospital adult non traumatic cardiac arrest patients greater than twelve years of age or 40 kg, attended to by the Paramedics and transferred to hospital were included in the study. Eight ambulance services, 209 paramedics, and eight hospital emergency departments were involved. All paramedics were trained during a 4 hour classroom and manikin course and certified to use the LMA in the field.

Results: Two hundred and eight paramedics completed the training and certification. During the training, of the 193 paramedics in which the number of attempts was recorded, the mean number of attempts was 1 and only 4 (2.1%) paramedics required a second attempt. During the subsequent study period a total of 291 cardiac arrests were observed. Insertion of the LMA was attempted in 283 (97.3%) of these arrests. Insertion was successful after one or more attempts in 199 (70%) patients. However, the LMA became dislodged in 5 (2.5%) of these patients and 12 patients (6.0%) required its removal due to inability to clear vomit in the airway. Thus, the number of successful insertions as defined by the study criteria was 182 (64%).

Conclusions: This study shows that paramedics can be trained in the use of the LMA on manikins in the classroom and this translates into successful insertion and ventilation in the field in about 64% of adult cardiac arrest patients. Therefore it is our conclusion that the LMA would be a useful BLS adjunct and a useful alternative to the oral airway and BVM for ventilation in adult out of hospital cardiac arrest.

052 MULTICENTER CONTROLLED CLINICAL TRIAL TO EVALUATE THE IMPACT OF ADVANCED LIFE SUPPORT ON OUT-OF-HOSPITAL RESPIRATORY DISTRESS PATIENTS

I.G. Stiell, G.A. Wells, D.W. Spaite, G. Nichol, L. Nesbitt, V.J. De Maio, M.B. Lyver, D. Brisson, M.T. Martin, J. Doherty, T. Beaudoin, D. Cousineau, for the OPALS Study Group. *Clinical Epidemiology Unit, F6, Ottawa Hospital, Civic Campus, 1053 Carling Avenue, Ottawa, Ontario K1Y 4E9, Canada*

Objectives: There is little published evidence regarding the optimal EMS management of respiratory distress. Our study evaluated the impact of advanced life support (ALS) EMS programs on respiratory patient outcomes.

Methods: This multicenter before-after controlled clinical trial was conducted in 20 communities (population 15,000 to 750,000) as part of the Ontario Prehospital Advanced Life Support (OPALS) Study, which evaluates the impact of EMS programs for multiple conditions. During the before phase, care was provided at the BLS-D level. During the after phase, ALS providers performed endotracheal intubation and administered nebulized and IV drugs. Data were collected from ambulance reports, centralized dispatch data, ED records, and in-hospital records. Chi-square and Student's t-test analyses were performed.

Results: The 7,716 patients enrolled during the two 6-month BLS and ALS phases were well matched for clinical and demographic features and had these characteristics: mean age 74.0 (16–107), female 53.6%, EMS status 'severe/life threatening' 51.8%, mean RR 28, final hospital diagnoses: CHF 16.9%, COPD 16.3%, pneumonia 9.8%, asthma 5.7%, other cardiac 4.8%, CHF/COPD 3.4%, cancer 2.9%. During the ALS phase, patients received these EMS interventions: nebulized salbutomol 55.3%, IV furosemide 15.2%, SL NTG 9.6%, IV morphine 1.5%, intubation 1.2%. There was a 23.4% relative reduction in the primary outcome, overall mortality, from the BLS to the ALS phase (15.4% vs 11.8%; P<.001). This table compares other outcomes.

Abstract 52

Measurement	BLS	ALS	p-value
EMS-judged 'improved'	24.6%	46.7%	.0001
ED mortality	1.2%	0.9%	.0001
ED intubation	4.9%	3.5%	.001
CXR Aspiration	4.4%	1.8%	.001
Length of stay, days	10.2	9.3	.05
Best CPC at discharge	42.6%	58.7%	.0001

Conclusions: This is the largest controlled trial of out-of-hospital respiratory distress patients and clearly shows important benefit from ALS programs for mortality and other outcomes.

053 INITIAL EXPERIENCE USING A WAIVER OF INFORMED CONSENT IN THE PREHOSPITAL SETTING

J. Thompson, D. Petrie, S. Ackroyd. *Department of Emergency Medicine, QEII Health Sciences Centre, Halifax Infirmary, 1796 Summer St, Halifax, NS, Canada, B3H 3A7*

Introduction: Beginning in August 1998 the Canadian *Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans* has

permitted enrollment into research studies without informed consent providing a set of prespecified conditions are met. We report our experience in applying this policy in the Halifax Prehospital Continuous Positive Airway Pressure (CPAP) for Acute Respiratory Failure Trial, the first study to apply the Policy both in Canada and to the prehospital setting.

Methods: The study protocol was first submitted for Research Ethics Board (REB) review in August 2000. The protocol specifies that paramedics randomize eligible patients in acute respiratory failure to either a trial of CPAP or standard therapy at the scene. The REB sought independent consultation from 2 reviewers with expertise in bioethics as part of the review process.

Results: Final protocol approval was received in November 2001 after a lengthy consultation and re-review process. Applying the Policy Statement in light of the fact that eligible patients entering the study are conscious and even communicative proved especially problematic for the REB. The review process spawned an Ethical Considerations in Emergency Medicine Research Workshop and a related working group. Feedback from paramedics, patients, and physicians involved in the study has been positive to date.

Conclusions: Our experience suggests there may be a poor understanding among REBs regarding the nature and practical constraints of emergency research, especially in the prehospital setting. Furthermore, our REB's reluctance to approve a waiver of informed consent highlights our responsibility as emergency researchers to educate ourselves regarding the policies governing research in emergency situations and our REBs about emergency research and state-of-the-art applied ethics. Consensus among emergency researchers and REBs regarding the application of the Policy Statement will remove significant barriers to research involving critically ill patients in the Emergency Department and prehospital settings.

054 PERFORMANCE OF AN OUT-OF-HOSPITAL CARDIAC ARREST SYSTEM USING SEMI-AUTOMATIC EXTERNAL DEFIBRILLATORS AND COMBITUBE® IN THE URBAN REGION OF QUEBEC CITY

C. Topping. *Faculté de médecine, Université Laval, Québec G1K 7P4*

Introduction: In September 1994, semiautomated external defibrillators (SAED) and Combitude® were added to the standard equipment of the Quebec City Emergency Medical Services (EMS) system. Basic Emergency Medical Technicians (b-EMTs) received a 24-hour training on the use of these devices. This study assesses the system performance in cardiac arrests after introduction of these tools, using an Utstein template to report data. There are no similar reports in the medical literature.

Methods: This EMS system covers an urban area of 331 square kilometers and is the sole provider to 422 530 inhabitants. From September 1995 to March 2001, all cases of cardiac arrest were reviewed by a physician and data extracted to assess system performance. All non traumatic out-of-hospital cardiac arrests were considered. When resuscitation was considered futile, a non resuscitation protocol was applied.

Results: Resuscitation was considered for 2322 cardiac arrests and initiated for 1773. The mean call-response ('911 call' to 'vehicule stop') interval was 7:21 minutes; 64,6% were under eight minutes. Cardiac etiology was suspected for 1472 events. Bystander cardiopulmonary resuscitation was performed for 278/1773 (15,7%) arrests. Six-hundred-and-eighty arrests were witnessed. Return of spontaneous circulation was achieved for 278 patients (18,9%). Survival rate was 14,4% (51/354) for witnessed arrests found in ventricular fibrillation (354/680) and 5,0% (74/1472) for arrests of cardiac etiology. Information on Combitube® was available for 1709 resuscitations. Patient rigidity, unsuccessful attempts or presence of contraindications precluded Combitube® insertion for 233 patients. Combitube® was positioned in the esophagus for 1496 (97,1%) of the remaining 1540 patients and 95,1% (1464/1540) of insertions were judged efficacious.

Conclusions: This study confirms satisfactory performance of b-EMTs employing SAED and Combitube® for out-of-hospital cardiac arrests despite short training and a long call-response interval.

055 RESULTS OF UTILISATION OF THE COMBITUBE® IN AN OUT-OF-HOSPITAL CARDIAC ARREST SYSTEM: 2344 CASES IN THE QUEBEC CITY REGION

C. Topping. *Faculté de médecine, Université Laval, Québec G1K 7P4*

Introduction: In September 1994, semiautomatic external defibrillators (SAED) and Combitude® were added to the standard equipment of the Quebec City Emergency Medical Services (EMS) system. Basic Emergency Medical Technicians (b-EMTs) received a 24-hour training on the use of these devices of which four hours are specific for Combitube®. This study reports utilisation data for Combitube® in an out-of-hospital cardiac arrest setting. There are no reports of this type and size in the medical literature.

Methods: This EMS system covers an urban and rural area of 17 514 square kilometers and is the sole provider to 633 511 inhabitants. From September 1995 to March 2001, all cases of cardiac arrests were reviewed by a physician and data extracted to assess system performance. Indications for use of Combitube® included all cardiac arrests. Contraindications were height less than 152 cm or more than 213 cm, presence of a gag reflex, suspected caustic ingestion, and tracheotomy.

Results: There were 3372 cardiac arrests considered for resuscitation and 2502 resuscitations were attempted. Information on Combitube® is available for 2416 of these. Combitube® was not inserted in 72 patients either because of rigidity, presence of contraindication or b-EMT's decision to ventilate with bab-valve-mask. 2169 (92,5%) attempts were successful and 2058 (87,8%) were judged efficacious by a physician. Combitube® was in the oesophageal position in 96,5% (2094). There were 8 complications during the study period: five cases of subcutaneous emphysema, two oesophageal perforations and one pneumoperitoneum. Survival rate was 14,4% (51/354) for witnessed arrests found in ventricular fibrillation (354/680) and 5,0% (74/1472) for arrests of cardiac etiology.

Conclusions: This study confirms excellent performance of Combitube® use by b-EMT's after only four hours of training for patients suffering out-of-hospital cardiac arrest in the Quebec City region.

Education

056 INTERRATER RELIABILITY OF APPLICATION PACKAGE ASSESSMENTS USING A STRUCTURED SCORING SYSTEM

G.W. Bandiera. *769 Spadina Rd, Toronto, ON M5P 2X5*

Objective: To determine the interrater reliability of scores assigned to application packages from medical students applying to the FRCP Emergency Medicine Program through CaRMS.

Methods: An application scoring sheet was derived based on input from faculty, residents and previous application procedures. The sheet provided a score based on objective anchors for each of four dimensions: curriculum vitae, personal letter, academic transcript, and reference letters. Applications were submitted through the standard CaRMS process. A group of three assessors were introduced to the scoring system in a detailed tutorial session. Each assessor was given five applications to score and results compared for understanding of the scoring principles. Each assessor then scored each application independently. The data from the score sheets was entered into an excel database by a single person and twenty percent was re-entered for assessment of data entry error. Agreement was calculated using SPSS.

Results: There were 51 complete applications. The agreement on the four dimensions ranged from 0.86 to 0.77, 0.52 to 0.48, 0.73 to .51, and 0.76 to 0.59. Intraclass correlations were 0.92, 0.74, 0.84, and 0.86. The overall score correlation was 0.89. When dichotomized into an interview/no interview format, the correlation dropped to 0.77.

Conclusions: There was a high level of agreement between the assessors for the curriculum vitae, the transcript, and the letters of reference. There was less agreement on the personal letter. Overall agreement for the entire application package is high.

057 USING WEB-BASED TECHNOLOGY IN THE INSTRUCTION OF BASIC AIRWAY MANAGEMENT TO MEDICAL STUDENTS: A PILOT PROJECT

J. Chenkin, R. McGraw, W. Pickett. *Department of Emergency Medicine, Kingston General Hospital, 76 Stuart Street, Kingston, Ontario, Canada, K7L 2V7*

Introduction: Internet-based learning resources have the potential for anytime, anywhere access for students. However, for technology-based remote learning to be successful there must be few barriers to the user. The purpose of this project was to determine the ease of

access and use of an online interactive learning module for the instruction of basic airway management to medical students.

Methods: A computer-based interactive basic airway management module, incorporating text, images and videos was made available over the Internet. The module could be accessed through a Webpage from home or from any of 45 on-campus School of Medicine computers. Eighty second-year Queen's University Medical School students were told to review the module prior to a hands-on seminar. To encourage use, the students were told there would be a quiz at the start of the seminar. The class was surveyed to determine the ease of access and usage of the module.

Results: Over the instruction period, 04 Sept 2001 to 13 Nov 2001, there were 405 hits to the module Webpage. Sixty (75%) students responded to the survey. Fifty-four (90%) of the students had Internet access at home and 47 (78%) students used their home computer to access the module. Twelve (20%) students reported using school computers to access the module. Most students reported few problems accessing a computer with Internet access (Mean Likert Score: 4.3/5) and felt the online format was a convenient way to learn the material (4.3/5).

Conclusions: The results suggest that this online resource was favourably received by the majority of students and most used home computers to access the module. Most students reported that the online format was convenient, that they plan to use the modules again and would like to see more online resources incorporated into the curriculum. Based on this we plan to continue using this module and we have plans to introduce further modules as they are developed.

058 INTERNET ACCESS TO COMPUTER-BASED CME IN SOUTHEASTERN ONTARIO: ARE PHYSICIANS AND HOSPITALS READY?

K. Sampsel, B. McGraw, L. Tomalty. *Department of Emergency Medicine, 76 Stuart Street, Kingston, Ontario K7L 2V7*

Background: The use of computer-based technology in medical teaching has increased exponentially. One area that has potential for the application of these technologies is the provision of online Continuing Medical Education (CME) programs to rural and remote areas. However, access to programs that involve interactive graphics and video may be limited by the local computer hardware or speed of internet connection. Prior to implementing a series of computer-based CME learning modules we wanted to assess the computer resources available to hospitals and physicians in rural and remote areas of southeastern Ontario.

Methods: A series of hospital site visits and surveys were conducted within the Queen's University CME catchment area. During site visits, the investigators used the local hospital computer facilities to access learning modules from the Queen's University server. The ease of access and practical performance of the modules were assessed. Further, physicians at two sites were asked to complete a survey about their use of home computers for educational purposes.

Results: All of the learning modules tested from the sites could be operated by some means (over the internet, downloaded from the internet or via a CD-ROM) at all of the locations evaluated. Current use of computers for educational purposes by physicians either at home or at the local hospital varied by location and physician. The majority of survey respondents reported current use and interest in future online CME-accredited applications.

Conclusions: Internet access to multimedia learning modules by physicians in southeastern Ontario is currently feasible and has potential for widespread use with minimal upgrades to existing infrastructure. Additionally, a majority of physicians are currently using computers and the internet for educational purposes and show interest in online CME initiatives.

International/societal

059 UNIVERSAL SCREENING FOR INTIMATE PARTNER VIOLENCE IN THE EMERGENCY DEPARTMENT: THE PATIENT'S PERSPECTIVE

K. Hurley, T. Brown-Maher, S. Campbell, T. Wallace, R. Venugopal, D. Baggs. *CRC-IHRT, Room 1758E, Health Sciences Centre, 300 Prince Philip Drive, St. John's, NF, Canada A1B 3V6*

Background: Universal screening for intimate partner violence (IPV) in the emergency department (ED) has been advocated by numerous medical institutions. Implementation of policies to screen for IPV, however, have met with numerous obstacles, one of which is the perception by emergency personnel that patients might be offended by such screening if they had presented to the ED for problems unrelated to trauma.

Objectives: To assess opinions of ED patients regarding a policy of universal IPV screening for females presenting to the ED.

Methods: This study was conducted in Eds at Dalhousie University and Memorial University of Newfoundland (MUN). A convenience sample of 514 undifferentiated ED patients, 250 from Dalhousie and 264 from MUN, were questioned as to 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 QEII 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 514 undifferentiated ED patients, ages ranged from 16–95 years, and 304 (59.1%) were female. Four hundred forty-two (85.9%) answered 'yes' to the question. Fifty-three (10.3%) answered 'no', 17 (3.3%) had no opinion and 2 (0.4%) were excluded from the analysis. There were no significant differences between the proportion of 'yes' and 'no' answers in the male and female groups; 'yes' in 85.2% of males and 86.5% of females, and 'no' in 10.0% and 10.5%, respectively.

Conclusion: Universal screening for IPV amongst female patients presenting to the ED is supported by 86% of patients, and patient objections should not be seen as a reason to withhold questioning on this issue.

Posters

060 CONCORDANCE BETWEEN RADIOLOGY REPORTS AND EMERGENCY PHYSICIANS' DIAGNOSIS OF COMMUNITY-ACQUIRED PNEUMONIA IN PATIENTS DISCHARGED FROM AN EMERGENCY DEPARTMENT

S.G. Campbell, W. Patrick, S.Varley-Doyle, M. Ells, D. Murray, D. Urquhart, D. Maxwell, A. Hawass, R.A. McIvor, P. Hernandez, C. McParland, D. Haase. *Department of Emergency Medicine, Queen Elizabeth II Health Sciences Centre, 1796 Summer St, Halifax, Nova Scotia, Canada. B3H 3A7*

Introduction: Chest x-ray (CXR) has long been considered the 'gold standard' for the diagnosis of community-acquired pneumonia (CAP); however CXR may miss up to 30% of pneumonias seen on chest CT. Recent suggestions that acute bronchitis not be treated with antibiotics have highlighted the importance of differentiating the two conditions. Radiologists rarely have the benefit of direct patient contact when deciding on the clinical relevance of seemingly unimportant x-ray features. Although numerous studies (using CXR as the standard) have described 'miss' rates in CAP, very little work has been done on cases where the treating physician 'overcalls' the diagnosis.

Objectives: To evaluate the level of concordance between radiology reports, (received after discharge of patients), with the diagnosis of CAP in patients discharged from an emergency department.

Methods: Three investigators conducted a retrospective chart audit of all patients identified in the ED database as having been discharged with a diagnosis of 'pneumonia' or 'possible pneumonia' during the period 3 Jan 1999 – 3 Jan 2001. Emergency physician (EP) and radiology report (RR) diagnoses were categorized as 'pneumonia', 'possible pneumonia', 'non-pneumonia' and 'normal', and reports for each patient were compared.

Results: 867 patients were identified for audit. Of these, x-rays were performed in 844 (97.3%). RR were not found in 31 cases (3.67%). Of 669 EP diagnoses of 'pneumonia', 304 (37.4%) RR's were in agreement, although in 82(10%), the RR diagnosis was of 'possible pneumonia) of 813 EP diagnoses of 'pneumonia' or 'possible pneumonia', 426 (52.4%) of RR's were in agreement. 214(26.3%) of RR's in the combined group were of diagnoses other than pneumonia, while 173(21.3%) were read as 'normal'.

Conclusion: EP's and radiologists frequently disagree on whether a patient has pneumonia or not. Perhaps it is time too revisit the 'gold standard' status of plain chest x-ray.

061 PATIENTS WITH COMMUNITY-ACQUIRED PNEUMONIA DISCHARGED FROM THE EMERGENCY DEPARTMENT ACCORDING TO A CLINICAL PRACTICE GUIDELINE: A TWO-YEAR OBSERVATIONAL STUDY

S.G Campbell, W. Patrick, S. Varley-Doyle, M. Ells, D. Murray, D. Urquhart, D. Maxwell, A. Hawass, R.A. McIvor, P. Hernandez, C. McParland, D. Haase. *Department of Emergency Medicine, Queen Elizabeth II Health Sciences Centre, 1796 Summer St, Halifax, Nova Scotia, Canada B3H 3A7*

Introduction: Clinical practice guidelines (CPG) decrease admission rates for CAP, although the safety of decreased admissions in non-study settings remains unclear. According to the CPG at our institution, patients with a pneumonia severity score (PSS) of < 90, (Fine groups I to III) and who met each of 4 additional discharge criteria, are discharged, with referral for telephone follow-up in 24–48 hours.

Objectives: Primary objective: To assess the safety of discharging patients with CAP according to a CPG based on a pneumonia severity scoring system. Secondary objective: To assess the utility of a 24–48 hour follow-up call.

Methods: A retrospective chart audit of all patients identified in the ED database as having been discharged with a diagnosis of pneumonia during the period 3 Jan 1999 – 3 Jan 2001. Readmission or death rates within two weeks of the emergency visit were evaluated, using data from all local hospitals and from the provincial coroner.

Results: 867 patients were identified. The average age was 55.5 years. (range 16–98), and the mean PSI score was 69.2 (range 6–187). 26 (3%) were readmitted within 2 weeks, 15 (1.7%) died within 2 weeks. Of 148 (17.1%) patients referred for follow-up, average age (58.8 vs. 54.9 p=0.08) and PSI scores (67.2 vs. 69.6 (p=0.4)) were similar to patients not referred. There were no significant difference in deaths (1.4% vs. 1.8% p=0.5) or readmissions (4.7% vs. 2.6% p=0.18). within two weeks between the groups

Conclusion: The use of a CPG to guide the discharge of patients from the ED appears to be safe. Patient follow up referrals are infrequently made, and the chance a referral does not appear to be linked to the PSI of the patient, but there does appear to be a trend toward older patients being referred, and a higher subsequent admission rate.

062 THE CONTRIBUTION OF BLOOD CULTURES TO THE CLINICAL MANAGEMENT OF ADULT PATIENTS ADMITTED TO HOSPITAL WITH COMMUNITY-ACQUIRED PNEUMONIA. A PROSPECTIVE OBSERVATIONAL STUDY

S.G. Campbell, R. Anstey, S. Ackroyd-Stolarz, G. Dickinson G, T.J. Marrie. *Department of Emergency Medicine, Queen Elizabeth II Health Sciences Centre, 1796 Summer St, Halifax, Nova Scotia, Canada B3H 3A7*

Objective: To assess the clinical usefulness of blood cultures (BC) in the management of patients hospitalized with community-acquired pneumonia (CAP).

Design: A prospective, observational study to investigate the contribution of BC to the management and outcomes of adult patients presenting with CAP.

Setting: Nineteen Canadian hospitals.

Patients: Adults admitted with CAP between January 1 and July 31, 1998.

Interventions: The courses of therapy in patients in whom BC results had yielded organisms considered to be clinically significant were analyzed to determine whether the BC had contributed to their management or outcome.

Measurements and Results: 43 out of 760 patients had significantly positive BC. Patients with CAP who had blood cultures performed had a 1.97% chance (15/760) of having a change of therapy directed by the results of the culture. Patients in whom blood cultures did yield positive results had 34.8% chance (15/43) of having a change in therapy determined by the result, and had a 58.1% chance (25/43) of having a course of therapy contradicted by the BC findings. Severity of illness, as measured by the Pneumonia Severity Index, correlated poorly with the yield of BC. BC were positive in 8.0% of patients in risk classes I and II, 6.2% in class III, 4.6% in class IV, and 5.2'% in class V.

Conclusion: Blood cultures have limited usefulness in the management of patients admitted to hospital with uncomplicated community-acquired pneumonia and their use should not be considered routine.

063 UTILITY OF BLOOD CULTURES IN THE OUTPATIENT MANAGEMENT OF COMMUNITY-ACQUIRED PNEUMONIA

S.G. Campbell, R. Anstey, S. Ackroyd-Stolarz, G. Dickinson, T.J. Marrie. *Department of Emergency Medicine, Queen Elizabeth II Health Sciences Centre, 1796 Summer St, Halifax, Nova Scotia, Canada B3H 3A7*

Objective: To assess the clinical utility of blood cultures in the outpatient management of adults with community-acquired pneumonia (CAP).

Methods: A prospective observational study of outpatients from the "capitaL study" population to investigate how blood culture (BC) results affect the management and outcomes of adult patients discharged from the emergency department (ED) after being diagnosed with CAP. Changes (or the lack of changes) in the antibiotic regimens of patients with positive BC results and patient outcomes were examined in an attempt to assess the influence of BC results on clinical management.

Results: Blood cultures were obtained from 289 outpatients. Six clinically significant organisms were identified (a yield of 2.1%). Outpatients with CAP who had blood cultures performed had a 0.69% (2/289) chance of having a change of therapy directed by the results of the culture. Positive blood cultures were 3.25 times more likely in patients with Pneumonia Severity Index (PSI) scores greater than 90.

Conclusion: Blood cultures have limited utility in the ambulatory management of community-acquired pneumonia, and should not form part of routine outpatient management.

064 A PROSPECTIVE SURVEY OF THE NEED FOR EMERGENCY PHYSICIAN PERFORMED ULTRASONOGRAPHY

J. Caudle, T. O'Brien. *Department of Emergency Medicine, Empire 3, Kingston General Hospital, Kingston, Ontario, Canada K7L 2V7*

Introduction: Emergency physician performed ultrasonography is an effective diagnostic tool for patients with cardiac tamponade, ruptured ectopic pregnancy, abdominal aortic aneurysm and hemoperitoneum in blunt abdominal trauma. Use of emergent ultrasound has expanded in an attempt to provide timely patient care. In Canada, however, only three of eleven academic emergency centres are using ultrasonography in clinical practice. Information about the perceived clinical need for ultrasound is anecdotal. This study quantifies this perceived need among emergency physicians from the Kingston General Hospital which houses the academic emergency program affiliated with Queen's University.

Methods: Prospective study of treatment provided to consecutive patients (presenting between 15 May 2001 and 31 July 2001) with suspected diagnoses of: cardiac tamponade, ruptured ectopic pregnancy, abdominal aortic aneurysm and blunt abdominal trauma. Study outcomes include physician perception of the need for ultrasonography, the frequency that ultrasound was required to address a specific goal and actual referral to medical imaging.

Results: 118 of an estimated 125 (94%) patients were enrolled. 89/118 (75%) patients were identified as suitable candidates for emergent ultrasonography including those with blunt abdominal trauma (44/45; 98%), cardiac tamponade (43/43; 100%), abdominal aortic aneurysm (8/9; 88%) and ectopic pregnancy (15/17; 88%). 100% of the scans were goal directed with 'visualizing free peritoneal fluid' most frequently reported 45/89 (51%).

Conclusions: Emergent ultrasonography appears to be a useful adjunct for the diagnosis of patients with life-threatening conditions. Current clinical practice can support the numbers of ultrasound examinations required to attain credentialing through the *Society of Academic Emergency Medicine*.

065 CAN EMERGENCY DEPARTMENTS AFFORD NOT TO CARRY ESSENTIAL ANTIDOTES?

M.L.A. Sivilotti, J.S. Eisen, J.S. Lee, R.G. Peterson. *Department of Emergency Medicine, Kingston General Hospital, Empire 3, 76 Stuart Street Kingston, Ontario K7L 2V5*

Background: Multiple surveys have demonstrated serious deficiencies in the type and quantity of antidotes readily available in most emergency departments (ED). Undue emphasis on the purchase price of several expensive antidotes contributes to this problem by creating the perception that comprehensive antidote stocking is too costly for

smaller centers. For rarely used medications, however, purchase price alone is an insufficient estimate of cost.

Objective: To model the initial and annual maintenance cost needed for small to medium Canadian ED to maintain an appropriate stock of essential antidotes.

Methods: ED pharmacy cost analysis was performed using the following input variables: essential antidotes based on expert consensus, estimated frequency of administration, price, shelf-life, and supplier replacement policy for expired drug.

Results: The projected annual maintenance costs for an appropriate stock of antidotes ranged from $CDN 686.99–3453.88 (population base 20,000–100,000 persons, distance to referral center 1–4 hours), and $CDN 2131.55–5414.38 if fomepizole were stocked rather than intravenous ethanol. Altering supplier policy to free replacement on expiry for fomepizole (as in the U.S.) and for the nitrite/thiosulfate cyanide kit (or hydroxycobalamin) would reduce these costs to $CDN 631.78–4240.68/year. The need to stock additional antidote to manage a patient for the initial four hours as compared to one hour had minor impact on costs (23–43% increase).

Conclusions: While other factors (antidote efficacy, safety and available alternate therapy) need to be considered, the cost of maintaining infrequently used antidotes on formulary is not primarily determined by purchase price, but rather by shelf-life and frequency of use. A change in supplier policy to free replacement of expired fomepizole and cyanide antidotes (i.e. infinite shelf-life) would have a considerable effect on making these antidotes less costly for smaller Canadian ED. An included interactive tool (available at http://www.caep.ca/cjem) allows costs to be estimated for individual ED.

066 DOES URINE SCREENING FOR DRUGS OF ABUSE CHANGE THE MANAGEMENT OF EMERGENCY DEPARTMENT PATIENTS?

J.S. Eisen, M.L.A. Sivilotti, C. Collier. *Department of Emergency Medicine, Kingston General Hospital, Empire 3, 76 Stuart Street, Kingston, Ontario K7L 2V5*

Background: It is estimated that substance use is a frequent factor in Emergency Department (ED) visits. Qualitative urine testing for drugs of abuse (U-DOA) is frequently ordered, but is limited in its ability to establish the identity, timing or dose of substances used. Although previous retrospective studies have demonstrated these limitations, their study design cannot be used to determine whether U-DOA provides useful information to the ED physician when making patient care decisions.

Objective: To isolate and measure the impact of U-DOA on ED patient care.

Methods: All U-DOA ordered in adult patients seen in two teaching EDs were eligible; screens that were ordered for victims of trauma or sexual assault were excluded. Prior to reporting the test results to the ED, ordering physicians were phoned by the investigators and queried about their patient care plans before, and then immediately after the results were disclosed. This design isolated the impact of the U-DOA screen on ED patient care decisions. Any changes in plan reported by the physician were compared to a pre-determined set of changes that were considered to be clinically important.

Results: To date, 81 U-DOA have been enrolled during a period with approximately 42,000 ED visits. One ED physician reported a change in plan (CT head deferred), but this change was not considered significant according to pre-specified criteria. U-DOA thus led to a clinically important change in management in 0/81 cases (95% CI 0–3.7%)

Conclusions: U-DOA is rarely helpful in guiding patient care decisions in the ED. These results call into question the need for the test in the ED setting.

067 MICROSCOPIC EXAMINATION NECESSARY FOR CEREBROSPINAL FLUID

C.H. LeBlanc. *Department of Emergency Medicine, QEII Health Sciences Centre, 1761 Summer Street Halifax, Nova Scotia B3H 3A7*

Objective: To determine if clear and colorless CSF requires further laboratory analysis in the work-up of subarachnoid hemorrhage.

Method: Laboratory data from all CSF specimens were reviewed from 95/12/24 to 96/05/22. All laboratory analyses on CSF specimens received by the laboratory were reviewed. The study was conducted at an adult university teaching hospital. The general appearance of the fluid was noted, as were the red blood cell (RBC) count and the white blood cell (WBC) count.

Results: The study sample included 74 CSF specimens. In our sample, 14.3% of the specimens had RBC counts of 50 x 10^6/L. It was determined that the practice of discarding CSF specimens after a clear and colorless fluid has been visually examined in the ED by the ED physician is unacceptable. Clear and colorless CSF specimens had as many as 760 x 10^6/L RBC's in our sample.

Conclusion: The practice of discarding CSF specimens which have a clear and colorless general appearance in the ED is unsafe and should be abandoned.

068 UTILIZATION OF STERILE VERSUS NON- STERILE GLOVES FOR THE REPAIR OF UNCOMPLICATED LACERATIONS IN THE EMERGENCY DEPARTMENT

V. Perelman, G. Francis, T. Rutledge, J. Foote, F. Martino, G.Dranitsaris. *North York General Hospital, 4001 Leslie St., North York, Ontario M2K 1E1*

Introduction: To determine whether the rate of infection using clean non-sterile gloves was equivalent to sterile gloves after the repair of uncomplicated lacerations in immunocompetent patients we compared the incidence of infection in the two groups.

Methods: A prospective single-blinded multicenter trial was employed. 820 individuals were enrolled in the study and randomized to sterile or clean boxed gloves at 3 different hospitals between December 28, 1998 and January 15, 2001. The attending physician or resident completed a brief checklist describing patient, wound and repair characteristics and indicated the type of glove used. The patients were provided with a questionnaire that was to be completed by the physician who removed their sutures at the prescribed time. The follow-up questionnaires included sections related to their wound repair.

Results: Follow up was obtained in 98% of the sterile gloves group and in 96.6% of the clean gloves group. There was no statistically significant difference in the incidence of infection between the two groups (6.1% sterile vs. 4.4% clean gloves, p>0.05). Wound irrigation reduced the risk of infection by 75%, while wounds related to sheared forces were 3 times more likely to get infected than wounds inflicted by sharp objects.

Conclusions: This study demonstrated that there was no significant difference in infection rates if one utilized clean gloves or sterilized gloves for the repair of uncomplicated lacerations in otherwise healthy patients. It also emphasized the importance of wound irrigation.

069 INTERNET USE IN THE DEVELOPMENT OF AN EVIDENCE-BASED PREHOSPITAL PROTOCOL DATABASE

D.A. Petrie, J. Ross, T. Murray, E. Cain, G. Kovacs, D. Urquhart, J. Tallon, B. Taylor. *Division of Emergency Medical Services, Department of Emergency Medicine, 351 Bethune, VG Site, QEII Health Sciences Centre, 1278 Tower Road, Halifax, Nova Scotia, Canada B3H 2Y9*

Introduction: Emergency Medical Services (EMS) has been criticized for the lack of empiric research supporting prehospital medical interventions. Though much has been published about the paucity of Randomized Controlled Trials (RCT's) in this area, there has been no systematic ranking (with the exception of cardiac arrest) of what evidence there ***is*** for specific prehospital interventions. The purpose of this project was to search, catalogue and rank the evidence for prehospital protocols in an easy-to-access electronic database. This database can be continually updated on the web and "peer-reviewed" by site users.

Methods: Protocols and interventions were organized, defined and delineated through consensus. Each intervention was treated as a critically appraised topic (CAT). A literature search was performed, a level of evidence was assigned to each paper, and then a class of recommendation was given to each intervention as per published clinical practice guideline development methods. Five M.D.'s were assigned various different protocols. Each intervention was reviewed and edited by two EMS physicians and a consensus was reached. The resulting database has been put on the web to seek constructive criticism for its continual improvement.

Results: 88 separate protocols were defined resulting in 406 different interventions. The evidence supported 13 (3.2%) Class A recommendations, 62 (15.3%) Class B recommendations, 283 (69.7%) Class C recommendations, 31 (7.6%) Class D recommendations and 17 (4.2%) class I - indeterminate interventions.

Conclusion: Prehospital interventions require more research to improve the certainty with which they can be recommended within the

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Assessment	Injury	No-injury	*p*-value	Kappa	Sens	Spec	O.R.
No Midline tenderness	13.9%	42.7%	0.001	0.78	86%	43%	0.4
No Posterolat tenderness	48.7%	34.2%	0.001	0.32	51%	34%	NS
No Deformity	6.1%	98.8%	0.05	N/A	4%	99%	NS
Able to Rotate	4.0%	56.4%	0.001	0.67	96%	56%	0.07
Able to Flex	1.3%	53.8%	0.001	0.63	99%	53%	0.05

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Physical findings	Injury	No-injury	*p*-value	Kappa	Sens	Spec	O.R.
Upright position	6%	39%	0.001	0.74	6%	62%	NS
Distracting injuries	15%	8%	0.001	0.41	15%	92%	NS
Unreliable 2nd Etoh/Drug	8%	4%	0.05	0.22	8%	96%	NS
Facial injury	43%	19%	0.001	0.75	43%	81%	1.8
Head injury	48%	20%	0.001	0.76	48%	80%	1.6
Motor deficit	5%	1%	0.001	0.93	5%	99%	NS
Sensory deficit	6%	2%	0.001	0.60	6%	98%	NS

context of protocol development. However, we feel this project is useful for the following reasons: (1) It becomes a common resource for medical directors in the process of protocol development, and (2) It becomes a baseline from which EMS researchers may target new research projects.

070 GATEKEEPING RESEARCH: THE EMERGENCY DEPARTMENT RESEARCH COMMITTEE

S. Ackroyd-Stolarz, D. Sinclair. *Queen Elizabeth II Health Sciences Centre, 1796 Summer St., Room 3021, Halifax, Nova Scotia, Canada B3H 3A7*

As the entry to the hospital system, the Emergency Department (ED) is seen as an important source of patients for recruitment into clinical trials from a number of specialties. Research activity can create additional work for already over-taxed clinical staff. In response to an increase in research –related demands, the Department of Emergency Medicine at the Queen Elizabeth II Health Sciences Centre in Halifax formed a research committee to review all protocols involving patient recruitment in the ED.

The Committee consists of three emergency physicians, two emergency nurses, a paramedic, and is chaired by the ED research consultant. All protocols from both within and outside the ED must be approved by the committee prior to patient recruitment. Research protocols are reviewed with respect to the following criterion: congruence with the ED strategic plan for research, inclusion of an ED co-investigator, full budget disclosure, and impact on clinical care in the department. Since 1999, 65 protocols have been reviewed, with 59 approvals and 6 rejections. The number of ED initiated studies has increased and funding from the outside studies has provided for 1.5 days/week in funding to support an ED research nurse. The committee has successfully raised the profile of research in a busy ED, and monitored workload issues to maximize patient recruitment.

071 HOW ACCURATE AND RELIABLE IS EXAMINATION OF THE NECK IN ALERT AND STABLE TRAUMA PATIENTS?

I.G. Stiell. *Clinical Epidemiology Unit, F6, Ottawa Hospital, Civic Campus, 1053 Carling Avenue, Ottawa, Ontario, Canada K1Y 4E9*

Objectives: Many physicians are reluctant to examine the neck of alert and stable trauma patients. This study assessed the accuracy and reliability of physical examination of the neck. METHODS: This prospective cohort study was conducted in 10 tertiary care EDs and involved alert (GCS 15) and stable adult trauma patients at risk for neck injury. Physicians loosened the neck collar and performed a standardized clinical exam for midline tenderness, postero-lateral tenderness, deformity, active rotation to 45 degrees, and active flexion. Where feasible, 2nd physicians performed interobserver assessments. Patients then underwent radiography to determine the outcome criterion, clinically important c-spine injury. Data analyses included univariate association, kappa, sensitivity, specificity, odds ratio by stepwise logistic regression.

Results: The 8,924 patients had these characteristics: important c-spine injury 1.7%; mean age 36.8 years; postero-lateral tenderness 65.5%; midline tenderness 57.8%; deformity 1.3%; able to rotate neck 55.5%; able to flex neck 52.9%. This table shows % of injury and non-injury patients with findings, p-value, kappa coefficient, sensitivity, specificity, adjusted odds ratio.

Conclusions: The most reliable and discriminating neck findings for identifying patients at low risk for cervical spine injury are 'ability to actively flex', 'ability to actively rotate the neck', and 'absence of midline tenderness'. Guidelines or decision rules for the management c-spine injury should incorporate these physical findings.

072 WHAT CAN BE GAINED FROM THE GENERAL PHYSICAL EXAMINATION OF ALERT PATIENTS WITH POTENTIAL CERVICAL SPINE INJURY?

I.G. Stiell. *Clinical Epidemiology Unit, F6, Ottawa Hospital, Civic Campus, 1053 Carling Avenue, Ottawa, Ontario, Canada K1Y 4E9*

Objectives: In the assessment of potential c-spine injury patients, what can be gained from the general physical examination? This study evaluated the accuracy and reliability of common physical signs.

Methods: This prospective cohort study was conducted in 10 tertiary care EDs and involved alert (GCS 15) and stable adult trauma patients. MDs performed a standardized exam for: patient position, distracting painful injuries, unreliability due to ethanol/drug intoxication, visible facial injury, visible head injury, motor deficit in extremities, sensory deficit in extremities. 2nd physicians performed interobserver assessments in 150 cases. Patients underwent radiography to determine the outcome, clinically important c-spine injury. Analyses included univariate association, kappa, sensitivity, specificity, odds ratio by multivariate logistic regression.

Results: The 8,924 patients enrolled over 36 months had mean age 36.8 and 1.7% had important c-spine injury. The table shows % of c-spine injury (N=151) and non-injury (N=8773) patients with the findings, p-value, kappa, sensitivity, specificity, adjusted odds ratio:

Conclusions: The findings 'distracting painful injuries' and 'unreliable due to etoh/drug' show poor interobserver agreement. The other 5 findings are reliable but only 'facial injury' and 'head injury' independently predict a higher risk of c-spine injury in alert trauma patients.

073 HOW ACCURATE AND RELIABLE IS MENTAL STATUS EVALUATION IN MINOR HEAD INJURY PATIENTS?

I.G. Stiell. *Clinical Epidemiology Unit, F6, Ottawa Hospital, Civic Campus, 1053 Carling Avenue, Ottawa, Ontario, Canada K1Y 4E9*

Objectives: Many physicians take a casual approach to mental status evaluation in minor head injury patients. This study assessed the accuracy and reliability of the Glasgow Coma Scale and the Object Recall Test.

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Assessment	Injury	No-injury	*p*-value	Kappa	Sems	Spec	O.R.
Initial GCS 13	18%	2%	0.001	0.84	18%	98%	2.2
Initial GCS 13/14	53%	17%	0.001	0.84	53%	83%	NS
GCS <15 at 2 hours	65%	13%	0.001	N/A	65%	87%	7.3
GCS <15 at 4 hours	64%	7%	0.001	N/A	64%	93%	NS
GCS <15 at 6 hours	38%	4%	0.001	N/A	38%	96%	NS
Any drop in GCS	21%	1%	0.001	N/A	21%	99%	NS
Object recall <3/3	72%	42%	0.001	0.64	72%	58%	NS

Methods: This prospective cohort study was conducted in 10 tertiary care EDs and involved adult head injury patients who presented with GCS 13–15 after loss of consciousness, amnesia, or confusion. Physicians made standardized assessments of the Glasgow Coma Scale and the Object Recall Test. 2nd physicians performed interobserver assessments for 101 cases. The 2-minute Object Recall Test consisted of showing patients 3 objects and asking them to recall the objects after 2 minutes and was scored from 0 to 3. Patients then underwent CT to determine the outcome criterion, clinically important brain injury. Data analyses included univariate association, kappa, sensitivity, specificity, odds ratio by multivariate logistic regression.

Results: We enrolled 3,121 patients with mean age 38.7 (16–99) and important brain injury 8.1%. This table shows % of injury (N=254) and non-injury (N=2867) patients with findings, p-value, kappa, sensitivity, specificity, adjusted odds ratio.

Conclusions: The most reliable and accurate mental status findings for identifying patients at risk for brain injury are 'initial GCS 13' and 'GCS <15 2 hours after injury'. Decision rules for the management of minor head injury should incorporate these findings.

074 ECSTASY STUDY: EVENING COHORT STUDY OF TORONTO SUMMER YOUTH

S. Friedman, H. Suttner. *73 Marlborough Avenue, Toronto, Onatario, M5R 1X5, Canada*

Introduction: We wish to characterize incidence of self-reported club drug (i.e. MDMA, GHB, Ketamine) use among youth and young adults attending an urban ED (emergency department), and to identify clinical and social correlates.

Methods: Prospective cohort study in the two EDs of a downtown teaching hospital. Patients between ages 15 through 30 who registered in the ED between 22:00 and 10:00 during a two month period were surveyed regarding drug and ethanol use.

Results: Data was collected on 183 (72 %) of 255 eligible patients. 10.4% reported using MDMA, GHB, Ketamine or other drugs within the past 24 hours, and 19.1 % reported use of these drugs or alcohol in the past 24 hours. Prevalence of polypharmacy was 50 %. GHB users reported polypharmacy 90% of the time, MDMA users 50 %, and Ketamine users 100 % of the time. 78 % of GHB users (P<.001) and 46 % of ethanol users (P<.001) arrived via EMS, vs. 17.5 % of the base population (BP). Length of stay was greater among ethanol users (249 min) but not club drug users compared to base population (155 min) (P < .001). 100 % of GHB users, 50 % of MDMA users and 50 % of ethanol users had a chief complaint or discharge diagnosis of substance abuse.

Conclusions: Use of club drugs is an important cause of ED visit. Polypharmacy may be an important correlate of emergency resource utilization in club drug users.

075 SUBCUTANEOUS EPINEPHRINE FOR BLS PARAMEDIC RESCUE OF THE CRASHING ASTHMATIC

R. Verbeek, J. Summers. *1120 Finch Ave W, Suite 405, Toronto, Ontario, Canada M3J 3H7*

Introduction: BLS paramedics face a dilemma when managing the crashing asthma patient who requires bag valve mask (BVM) ventilatory support since there is no practical method to administer aerosolized salbutamol, nor do BLS paramedics have skill training that allows for endotracheal or intravenous salbutamol administration. We recently introduced a medical directive for BLS paramedic administration of subcutaneous epinephrine (0.3 mg) for these patients.

Methods: A 12-month prospective review of the BLS paramedics' experience following the introduction of a subcutaneous epinephrine medical directive.

Results: 19 asthma patients requiring BVM support received subcutaneous epinephrine. There were 11 females/8 males with median age 30 yr (range 6–65). The case severity of all patients was coded by BLS paramedics as "severe" or "life threatening" and all were described by at least one of the terms, "cyanotic", "can't speak" (more than 2 words), or "absent, poor or reduced breath sounds". On arrival to the receiving ED, 12 of 14 patients (86%) with an initial GCS <15 had improved their score and only 6 of 19 (31%) patients required ongoing BVM support. Of the 13 patients who no longer required BVM support, only 2 of 13 (15%) patients had a respiratory rate <15 or >30 (compared to 10 of 13 (77%) prior to epinephrine),. Using a previously validated scale of change in patient status, 15 of 19 (79%) patients were coded by BLS paramedics as improved. No complications such as cardiac arrythmias, severe hypertension or chest pain were recorded. The median on-scene interval was 14 minutes and the median transport interval was 6 minutes.

Conclusion: Our preliminary experience suggests the use of subcutaneous epinephrine for BLS paramedic rescue of the crashing asthmatic may be an effective and safe treatment option even in EMS systems with a rapid transport interval. Further study is required.