UNIVERSITY OF SASKATCHEWAN

2017 EMERGENCY MEDICINE

RESEARCH DAY

AGENDA & ABSTRACTS

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EMERGENCY MEDICAL SERVICES

Emergency Medical Services Use of Vasopressors During Transport of Septic Patients: Evaluation of Overall Mortality

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INTRODUCTION: Sepsis is a serious and potentially life threatening condition. Prompt recognition of sepsis and implementation of early goal directed therapies within the first hours are instrumental in decreasing sepsis-related mortality.[1] In Saskatchewan, distances to medical centers can be large, thus making pre-hospital recognition of sepsis by Emergency Medical Services (EMS) personnel crucial. This study aimed to evaluate overall mortality related to EMS use of vasopressors in septic patients during ground transport.

METHODS: This was a retrospective study of 22 patients with an EMS diagnosis of suspected sepsis transported via ground ambulance within the Regina Qu'Appelle Health Regina to a Regina Emergency Department. The primary outcome measured was overall mortality. Secondary outcomes assessed included type of vasopressor selected, location of initiation of vasopressor, fluid volume received, length of hospital stay, and duration in intensive care. Data analysis was completed using descriptive statistics, t-tests and Mann Whitney testing.

RESULTS: Of the 22 patients identified, a total 16 survived to discharge. A relationship between the use of vasopressors and survival could not be determined as only 1 patient received any vasopressors during transport. Average fluid volume received during transport was 406ml and average time to a tertiary hospital was 43 minutes. There was no significant difference in overall mortality when comparing fluid volumes received in those who survived to those who did not (P=0.09).

CONCLUSION: Findings reflect patterns seen within the current literature, given the small study size it is difficult to extrapolate strong conclusions. Possible correlation between fluid volume received during transport and overall mortality was shown. Further prospective studies including randomized control studies are needed to evaluate the role of vasopressor use by EMS and if it should be carried by EMS in the future.

1. Levy MM et al; Surviving Sepsis Campaign: The Surviving Sepsis Campaign: Results of an international guideline-based performance improvement program targeting severe sepsis. Crit Care Med 2010;38:367–374

EDUCATION

Exploring the role of infographics for presenting medical literature: Comparing infographic-based article summaries to traditional abstract article summaries with regards to delayed knowledge retention, cognitive load and reader preference

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INTRODUCTION: Physicians and other healthcare professionals must stay up-to-date with medical literature. This is challenging due to the ever-expanding body of medical literature. Abstracts are helpful summaries of articles; however, graphical summaries may be more effective at delivering information. Infographics are defined as "visualizations of data or ideas that try to convey complex information to an audience in a manner that can be quickly consumed and easily understood" and are increasing in popularity as a medium for presenting medical literature. However, there is a paucity of research assessing the utility of infographics for this purpose.

METHODS: Infographic summaries were developed for 8 articles published in the Canadian Journal of Emergency Medicine. 72 Canadian emergency physicians reviewed eight summaries of these articles (four as traditional abstracts and four as infographics). After each summary was reviewed, participants indicated the cognitive load required to process each summary using a 9-point scale. After all summaries were reviewed, participants indicated their preference for traditional abstract or infographic summaries on a 9-point scale. Knowledge retention was tested four weeks later via true or false and short answer questions specific to each summary. Cognitive load and knowledge retention were compared between summary formats using paired-samples t-tests. All components of the study were hosted using *Qualtrics* survey software.

RESULTS: Participants preferred infographic to traditional abstract summaries. Cognitive load scores were lower with infographics ($M = 4.30$, $SD = 1.34$) than abstracts ($M = 5.06$, $SD = 1.35$); $t(71) = 4.41$, $p < 0.01$). There was no difference in delayed information retention.

CONCLUSION: The results of this study suggest that infographics could play a meaningful role as a format for presenting medical literature. However, further research clarifying the role of infographics is required.

QUALITY IMPROVEMENT

Emergency Department Discharge Communications to Family Physicians: What Clinicians Care About

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INTRODUCTION: Discharging a patient home with Family Physician (FP) follow up is the most common disposition plan from the emergency department. Communicating these visits well can enhance the continuity of care provided by FPs. ED discharge summaries vary in quality, content and means of delivery and are often cited as unsatisfactory by community and ED physicians alike. Physician priorities for effective discharge communication need to be defined.

METHODS: A cross-sectional survey of emergency physicians (EPs) and FPs was conducted. Physicians were asked to rank several features pertinent to effective discharge communication from the ED. Room was provided for written comments.

RESULTS: Thirty-seven surveys were completed, 18 by EPs and 19 by FPs. Both groups identified impression and plan as the most important element on the chart. Patients were seen to benefit most from improved communication. Sending a copy of a handwritten ED chart directly to the FP or with the patient are viewed as the least effective means of communication. EPs expressed concerns that other methods wound negatively impact time available for direct patient care. FPs expressed concerns with timeliness and illegibility of current discharge summaries. Both recognized lack of time as the greatest barrier to improving this communication link. A shared clinical information system was identified as a possible step towards improved communication.

CONCLUSION: Emergency and family physicians generally agree on the key features of ED discharge communication. Changes to the current system may improve efficiency, though concerns of another administrative burden in a time-stressed environment are prominent. Hybridizing these clinician concerns, we conclude that a legible, timely, efficiently created Record of Treatments (ROT) with a clear impression and plan is preferred. This link could be improved with shared clinical information systems that enable communication between FPs and EPs.

Trying to meet the 2004 AHA Guidelines for 'Time to ECG' in 2017

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INTRODUCTION: Chest Pain is a common presentation to Saskatoon's three Emergency Departments (ED). American Heart Association (AHA) Guidelines state that all patients presenting to an ED with cardiac chest pain should receive an ECG within 10 minutes of arrival. A previous quality assurance project in the Saskatoon Health Region (SHR) revealed a median time to first ECG of 24 minutes. This finding warranted implementation of an 'ECG Prioritization Initiative' using LEAN interventions. The purpose of this study is to examine the impact of these interventions.

METHODS: A retrospective chart review of all patients presenting to SHR with CTAS 2 chest pain during two pre- (Jan 1 - Mar 31, 2012) and post-intervention (Jan1 - Mar 31, 2015) time periods. Patient data were collected using Sunrise Clinical Manage and TraceMaster. The primary outcome was time from registration to first ECG. Secondary outcomes of interest were, time from registration to triage, time from triage to first ECG, and proportion of patients receiving their initial ECG within 10 minutes. Data were complied, and descriptive and non-parametric statistics performed.

RESULTS: There was no statistically significant difference in time from registration to initial ECG during the pre- (median 24.0 minutes [IQR 16.0 - 38.0]), and post-intervention (22.8 minutes [IQR 15.6 - 37.1]; p=0.32) time periods. However, time from triage to initial ECG improved (18.6 vs. 15.8 minutes; p=0.004). Further, the proportion of patients receiving their initial ECG within 10 minutes improved from 20.4% to 26.2% (p=0.004).

CONCLUSION: While overall time from registration to initial ECG did not improve pre- and post-intervention, our study highlights an improvement in triage time to initial ECG. Of note, time from registration to triage remains relatively unchanged suggesting a need for further refinement of our system.

Assessing the Ability of Emergency Department Patients to Self-Triage by Using an Electronic Questionnaire: A Pilot Study

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INTRODUCTION: Triage is used to prioritize the care of patients arriving in the emergency department (ED). In an attempt to test the feasibility of implementing self-triage in the ED, we sought to assess the ability of ED patients to triage themselves using an electronic questionnaire.

METHODS: This was a prospective observational study. An electronic questionnaire was designed with a series of 'yes' or 'no' answers. A score corresponding to the Canadian Triage and Acuity Scale (CTAS) was assigned based on their answers, without the knowledge of patients or ED staff. These scores were compared to the CTAS score assigned by triage nurses. We enrolled a convenience sample of ambulatory patients in the ED, excluding those arriving with EMS. We also sought to assess patients' ability to predict their disposition.

RESULTS: A total of 492 patients were enrolled. The mean age of enrolled patients was 43.9. Patient-determined CTAS scores were as follows: 26.7% CTAS 1, 13.4% CTAS 2, 35.8% CTAS 3 and 21.1% CTAS 4 and 5. Formal CTAS scores were: 9.6% CTAS 2, 31.5% CTAS 3, and 59% CTAS 4 and 5. With our questionnaire, 22.2% of patients matched their official scores and 69.9% of participants over-estimated it. Additionally, 41.3% of patients felt that required admission when only 17.3% were admitted.

CONCLUSION: Using an electronic questionnaire, ambulatory patients frequently overestimated the acuity of their presenting complaint. Patients were also not unable to accurately predict their disposition. Further study of different approaches to self-triage is needed before possible implementation in EDs.

Factors Associated with Prolonged Length of Stay of Admitted and Discharged Patients in a Tertiary Care Emergency Department

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INTRODUCTION: Extended length of stay (LOS) in emergency departments (EDs) and overcrowding are a problem for the Canadian healthcare system, which creates an access block, reduced health outcomes, and decreased satisfaction. The goal of this study is to identify and assess specific factors that predict length of stay in EDs for those patients who fall in the highest LOS category.

METHODS: We reviewed 130 and 603 charts of admitted and discharged Regina EDs (Pasqua and Regina General Hospitals) patients respectively. Included charts in this study were from the 90–100th percentile of time-stayers according to disposition, who were registered during February 2016 and were seen by an ED Physician. Patient demographic data and ED visit data were collected. T-tests and multiple regression analyses were conducted to identify any significant predictors of our outcome variable, LOS.

RESULTS: Demographic variables did not have a significant relationship with LOS, nor did most ED visit data. Time between consult request until disposition decision (admit or discharge) showed a significant relationship with LOS ($p<0.01$) for both admitted and discharged patients, while ultrasound (US) and CT imaging intervals were significant for discharged patients ($p<0.01$) as well. Potential confounding variables were analyzed, and hour of registration was significant ($p<0.01$). After adjustment using hierarchical multiple regression, our mentioned variables remained significant.

CONCLUSION: After adjusting for confounding factors, "consult request to disposition decision" was a strong predictor of LOS for admitted and discharged patients. US and CT imaging intervals were significant for discharged patients. The results of this study were limited to some extent by inconsistencies in the documentation of some of the analyzed metrics. Establishing standardized documentation could reduce this issue in future studies of this nature. Future areas of interest include establishing a standard reference for our variables, a further analysis into why consult requests are a major predictor, and how to alleviate this in the future.

CLINICAL MEDICINE

Bedside Ultrasound for Diagnosis of Small Bowel Obstruction in the Emergency Department

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INTRODUCTION: Small bowel obstruction(SBO) is a frequently considered differential diagnosis for patients with abdominal pain with a definitive diagnosis often requiring a CT scan. The purpose of this study is to evaluate the sensitivity and specificity of bedside ultrasound for the diagnosis of SBO in the emergency department for patients with low, medium and high probability of SBO.

METHODS: This is a prospective convenience sample of patients from two tertiary hospital emergency departments in Saskatoon. The study was approved by the University of Saskatchewan Biomedical Research Ethics Board. Scanning is done by the treating physician, or delegate with ultrasound experience who has undergone a training session. A patient is considered to have a diagnosis of SBO if: 1) a radiologist interpreted CT scan is positive for SBO, 2) a surgeon makes an operative SBO diagnosis or 3) the discharge summary diagnosis from general surgery is SBO. SBO is considered absent if alternate diagnosis is made or the condition is deemed unlikely and does not develop within days.

RESULTS: Data collection began in April 2017 and is ongoing with three patients enrolled so far. Two of the patients had low pretest probability and no SBO detected on ultrasound, while one was found to be moderate risk and their ultrasound indicated a SBO was present with > 2 loops of small bowel over 25 mm in diameter, and hyper-dynamic peristalsis with free fluid in the abdomen. Once the desired sample size has been recruited statistical analysis will determine the sensitivity, specificity, positive predictive value, and negative predictive value of ultrasound for SBO.

CONCLUSION: This study will build on previous studies as it evaluates the sensitivity and specificity of bedside ultrasound for the diagnosis of SBO for patients with low, medium and high probability of diagnosis.

A Retrospective Application of the HEART Score on Patients Evacuated from Northern Saskatchewan Communities due to Chest Pain: A First Step in Assessing the Utility of Point of Care Troponins for Outpost Nursing Stations

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INTRODUCTION: The HEART scoring system codifies the clinical gestalt used by physicians with 0-2 points assigned to five criteria (History, ECG, Age, Risk Factors, Troponin). This scoring provides a prognostic tool that assisted in disposition planning. The use of a truncated HEART score, minus the troponin data (HEAR score) was used for patients presenting with chest pain at one of four outpost nursing clinics. These outpost nursing stations have no onsite physician, and no ability to obtain any troponin data. This study set out to determine if there was any utility in conducting PoC troponins in these nursing outposts.

METHODS: A retrospective analysis was conducted using the La Ronge regional electronic medical record by searching for all patients for whom an outpost nurse had called a physician regarding symptoms of acute coronary syndrome between January 1, 2011 & December 31, 2016. The HEAR and HEART score were then calculated for each individual presentation of chest pain meeting inclusion and exclusion criteria.

RESULTS: By calculating both the patient's HEART score before evacuation and after (ie. with the troponin data), we were able to determine that in 90% of cases (111/124 events), patients would require evacuation regardless of the troponin values due to a HEART score ≥ 4. In 10% (13/124 events) of cases the patients who were evacuated had a HEART score ≤ 3 and in only 1 case did the troponin data increase this score.

CONCLUSION: The majority of patients would continue to be evacuated regardless of the result of their PoC troponin due to an already elevated HEAR score. A financial analysis does not support the use of PoC troponins as a cost saving measure for the reduction in evacuation of patients with chest pain from the nursing stations served by the La Ronge Hospital.

Sound resuscitation II: a pilot study on the use of resuscitative ultrasound by emergency physicians during critical care simulations

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INTRODUCTION: The introduction of ultrasound into resuscitation has generated questions about the sequence of events at the bedside. Clinicians must know not only how to scan, but also when to scan, how long to scan for and when to re-scan. Furthermore, resuscitative ultrasound calls for a re-sequencing of events that are dependent on the nature of the resuscitation in question. Critical care simulation offers rehearsal in a simulated setting.

METHODS: This simulation-based pilot study was designed to examine how effectively clinicians integrate resuscitative ultrasound into critical care. Six emergency physicians based in Saskatoon were recruited to perform three standardized critical care simulation scenarios (hemorrhagic, cardiogenic and obstructive shock) during which they had access to tertiary care resources including ultrasound. We evaluated the integration of resuscitative ultrasound as well as self-reporting measures in terms of confidence and other qualitative metrics. Overall leader performance was assessed using a validated tool (Ottawa GRS).

RESULTS: Of the six participants, four considered themselves advanced point of care ultrasound (POCUS) users while the other two ranked themselves as basic users. All subjects ranked relative comfort with resuscitation prior to the study. All had previous simulation experience and ultrasound training. Ultrasound was used by all the advanced users in each of the three scenarios, while one basic user used ultrasound (for two of three scenarios). Advanced POCUS users integrated ultrasound into the assessment of each patient leading to the correct diagnosis in all three scenarios while the basic users made the correct diagnosis in one of six simulations. Ottawa GRS scores were higher for the advanced group compared to the basic user group.

CONCLUSION: Advanced POCUS users performed highly in critical care simulation scenarios, using ultrasound to aid diagnosis. Further simulation exposure with integration of ultrasound may aid the basic user group with integrating ultrasound in a real-world setting.

A Pilot Study to Improve Pediatric Concussion Assessment and Management in the Emergency Department

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INTRODUCTION: Currently in the Regina Qu'Appelle Health Region (RQHR) there is no standardized approach to the evaluation and follow-up of pediatric concussion after presentation to the emergency department (ED). This study is the first phase of a two-phase study to examine the effect of staged, active, individualized recovery recommendations provided to parents and schools on recovery. This pilot study will collect data on post-discharge concussion symptoms to determine the time to symptom-free recovery at baseline and to characterize pediatric concussions in the RQHR.

METHODS: Caregivers of children between the ages of five and 17 presenting with head injuries to EDs in Regina, Saskatchewan were recruited. Caregivers were asked to complete online surveys at one, three, five and seven days post-injury as well as one and three months post-injury. The primary outcome was the time to symptom-free recovery. Secondary outcomes included the rate of specific activity-symptom patterns, time to return to school and play, rate of health care utilization and rate of post-concussion syndrome. Demographic data from a standardized intake form was analyzed to further characterize concussions in this age group.

RESULTS: Ten standardized intake forms were completed, with five participants providing data via online surveys on days one, three, five and seven post-injury. All five participants who completed the survey reported headache, drowsiness and fatigue initially. On day three, headache was still reported by all five participants; however, drowsiness and fatigue were each only reported by three participants and by day five headache was only reported by two participants and drowsiness and fatigue were each only reported by one participant. The number of participants reporting each of these symptoms on day seven was the same as day five; however the overall severity score had decreased.

CONCLUSION: Based on the current data, emerging trends suggest that headache, drowsiness and fatigue are the most common symptoms experienced post-concussion. Subject recruitment is ongoing and will hopefully enable stronger conclusions to be drawn regarding symptom trends post-concussion.

Identifying patients who may benefit from Resuscitative Balloon Occlusion of the Aorta (REBOA) in trauma who present to Saskatchewan emergency departments.

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INTRODUCTION: Despite advances in trauma care, hemorrhage remains a major cause of death in trauma. Non-compressible torso hemorrhage accounts for up to 60% of deaths from otherwise survivable injuries. Previously, the only rapid method to salvage these patients was cross clamping of the aorta. This is a procedure with limited success, major morbidity, and risks to staff. REBOA offers a rapid alternative to aortic cross clamping, with the benefit of selective level perfusion.

METHODS: A retrospective chart review of all level 1 & 2 traumas in Regina EDs in 2015 and 2016 was completed. All patients were evaluated according to published criteria for the initiation of REBOA, which included: PEA arrest (<10 mins) secondary to exsanguination from sub-diaphragmatic hemorrhage & femoral vessels readily identifiable on ultrasound, agonal stage due to non-compressible exsanguinating hemorrhage/ partial or non-responders to rapid volume resuscitation/ causes of obstructive shock excluded, systolic BP < 70 mmHg, suspected or diagnosed intra-abdominal hemorrhage due to blunt trauma or penetrating torso injuries (Zone I REBOA), blunt trauma patients with suspected pelvic fractures and isolated pelvic hemorrhage (Zone III REBOA), and penetrating injury to pelvic or groin area with uncontrolled hemorrhage from a junctional vascular injury (iliac or common femoral). Major exclusion criteria included: age less than 18 or greater than 70, and PEA arrest > 10 mins.

RESULTS: A total of two patients (0.83%) were eligible for REBOA in 2015, and one patient (0.38%) was eligible in 2016 (preliminary result - final chart review pending).

CONCLUSION: The results of the study resulted in a lower number of patients being eligible for REBOA than was hypothesized. At this time, there are multiple barriers to the implementation of REBOA; however, as will be further detailed in the presentation, this study, and studies completed at other institutions, show that there may be a home for REBOA within Canadian Emergency Departments.