

# RESEARCH DAY

# MANUAL

*University of Alberta*

*Department of Emergency Medicine*

*Faculty of Medicine and Dentistry*

*Tuesday, June 13<sup>th</sup>, 2017*

*Katz Group Centre for Pharmacy and Health  
Research*



UNIVERSITY OF  
ALBERTA

## RESEARCH DAY AGENDA (KATZ 1-080)

- 08:00 – 08:30    **Registration – Katz Lower Foyer**  
*View Posters*
- 08:45 – 09:00    **Overview of the Day – Professor Christopher McCabe**, Research Director, Endowed Chair of Research, Department of Emergency Medicine, Faculty of Medicine & Dentistry, University of Alberta
- 09:00 – 09:15    **Welcome Address – Dr. Richard Fedorak**, Dean, Faculty of Medicine & Dentistry, University of Alberta.
- Moderator: Professor Christopher McCabe*
- 09:15 – 09:30    **Dixon, A:** A comparison of temporal artery and rectal thermometry in infants 90 days and younger presenting to a pediatric emergency department.
- 09:30 – 09:45    **Verde, M:** Surge capacity length of stay in paediatric and adult emergency department. A comparison study.
- 09:45 – 10:00    **Krebs, L:** Computed tomography use for headache presentations to Emergency Departments in Alberta: regional, site and physician level variation.
- 10:00 – 10:15    **Ali, S:** Do caregivers refuse analgesia in the pediatric emergency department? A cross-sectional study in two Canadian centres.
- 10:15 – 10:30    **Mews, L:** In situ, multidisciplinary simulation encourages process change: a quality improvement project.
- 10:30 – 10:50    *Refreshments and Coffee – Katz Lower Foyer*  
*View Posters*
- 10:50 – 10:55    **Visiting Speaker Introduction – Dr. Brian Holroyd**, Chair, Department of Emergency Medicine, University of Alberta
- 10:55 – 12:00    **Keynote Lecture – Dr. Lisa Calder**, Director of Medical Care Analytics, CMPA. Associate Professor, University of Ottawa. Scientist of Clinical Epidemiology Program, Ottawa Hospital Research Institute.
- 12:00 – 13:00    *Complimentary Lunch – Katz Lower Foyer*  
*View Posters*

***Moderator: Dr. Sandy Dong***

- 13:00 – 13:15 **Villa-Roel, C:** Emergency department directed multifaceted interventions to improve outcomes after asthma exacerbations: a 3-armed randomized controlled trial
- 13:15 – 13:30 **Carr, M:** Exploring the effects of emergency department interventions on diagnostic imaging use: a scoping review.
- 13:30 – 13:45 **Lobay, K:** Optimizing the treatment offered by paramedics for patients who struggle with opioid use disorder.
- 13:45 – 14:00 **Olmstead, A:** Addiction medicine training in Canadian Emergency Medicine residency programs: a needs assessment survey.
- 14:00 – 14:15 **Sran, M:** Emergency department patient values: a discrete choice experiment.
- 14:15 – 14:30 *Refreshments and Coffee – Katz Lower Foyer  
View Posters*

***Moderator: Dr. Cristina Villa-Roel***

- 14:30 – 14:45 **Douma, M:** A scoping review of lay-person response guidelines to life-threatening opioid toxicity: a public health controversy.
- 14:45 – 15:00 **Odenbach, J and Eksteen, A:** Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) in Trauma: a systematic review.
- 15:00 – 15:15 **Kirkland, S:** A systematic review of the psychometric properties and diagnostic performance of instruments to identify mental health and substance use problems among children in the emergency department.
- 15:15 – 15:30 **Holroyd, B:** Variation in Alberta Emergency Department patient populations.
- 15:30 – 16:00 **Awards and Closing Comments**

- 08:30 – 16:00 **Poster Displays (Katz Foyer)**
- Poster 1:** **Alexiu, C:** Acute asthma presentations to emergency departments in Alberta: an epidemiological analysis of presentations.
- Poster 2:** **Alexiu, C:** Consultations in the Emergency Department: a systematic review.
- Poster 3:** **Cross, E:** Acute fatal nitrofurantoin-induced liver failure: a case report.
- Poster 4:** **Douma, M:** Airway, breathing, circulation... Google: an exploration of Google search queries related on “cardiac arrest” and “cardiopulmonary resuscitation”.
- Poster 5:** **Gaudet, L:** Diagnosis for mild traumatic brain injury in three Canadian emergency departments: missed opportunities.
- Poster 6:** **Jaggi, P:** Nursing duties and accreditation standards and their impacts: the nursing perspective.
- Poster 7:** **Kirkland, S:** Mixed effectiveness of emergency department diversion strategies: a systematic review.
- Poster 8:** **Krebs, L:** Choosing Wisely in the Emergency Department: exploring the reach, support, and potential for the Choosing Wisely Canada® campaign among emergency physicians.
- Poster 9:** **Krebs, L:** Exploring definitions of “unnecessary care” in emergency medicine: a qualitative analysis of physician survey responses.
- Poster 10:** **Mahjoub, R:** Evaluating the cost-effectiveness of monitoring tests
- Poster 11:** **Mews, L:** Goals of care for continuing care residents assessed by an EMS urgent response team: a retrospective observational study.
- Poster 12:** **Patrick, S:** Education and training on mild traumatic brain injury among emergency department physicians: a systematic review.
- Poster 13:** **Paulden, M:** Resource allocation, values and equity: maintaining equity in the face of anonymity
- Poster 14:** **Paulden, M:** Transforming the cost-effectiveness threshold into a ‘value threshold’: initial findings from a simulation model
- Poster 15:** **Villa-Roel, C:** Measuring health-related outcomes: is social desirability bias an issue we should be exploring while conducting Emergency Medicine research?
- Poster 16:** **Villa-Roel, C:** A prospective cohort study to evaluate discharge care for patients with atrial fibrillation and flutter (AFL/AF)

## Abstracts

### Oral Presentations

#### **A COMPARISON OF TEMPORAL ARTERY AND RECTAL THERMOMETRY IN INFANTS 90 DAYS AND YOUNGER PRESENTING TO A PEDIATRIC EMERGENCY DEPARTMENT.**

Dixon A, Craig WR, Curtis S, Ali S, Dow N, Biel N, Latoszek K.  
Stollery Children's Hospital, University of Alberta, WCHRI.

**INTRODUCTION:** Fever in an infant  $\leq 90$  days of age may be a marker of serious illness. Just having a fever in this age warrants some type of work up. In neonates ( $\leq 28$ d), identification of a fever means a complete septic workup, IV antibiotics and a hospital admission. The accepted definition of fever at this age is  $\geq 38^{\circ}$  C as measured rectally.

During the spring of 2014, our pediatric emergency department was informed that temperatures were to be taken by temporal artery thermometry (TAT), despite concerns from physicians and nurses that rectal temperatures were more accurate in this age group. This Quality Improvement Project sought to determine if TAT can reliably replace rectal thermometry in the management of infants under 3 months of age presenting to a pediatric emergency department by comparing the diagnostic test accuracy of TAT with the gold standard of rectal thermometry.

**METHODS:** All children presenting to the Emergency Department (ED) of the Stollery Children's Hospital equal to or less than 90 days of age were included. All enrolled infants had rectal and temporal temperatures performed (within 3 minutes). Demographics, ED diagnosis, ED disposition, ED length of stay, and 2 month follow up data were recorded.

**RESULTS:** Between May 4th 2015 and Mar 4, 2017, 930 infants were enrolled of which 831 were analyzable. Of the 58 patients with a fever by rectal temperature in only 19 (33%) was that fever detected by TAT. Conversely there were 16 patients with fever by TAT that were not detected on rectal thermometry. TAT had a sensitivity of 32.8% and a specificity of 97.9% to detect a rectal temperature of greater than  $38^{\circ}$ C.

**CONCLUSIONS:** Given the low concordance of results, and the previous use of rectal thermometry as a gold standard for fever in fever outcome studies in this age group, TAT does not appear to be an adequate replacement for rectal thermometry in infants under 90 days of age.

## **SURGE CAPACITY LENGTH OF STAY IN PAEDIATRIC AND ADULT EMERGENCY DEPARTMENT. A COMPARISON STUDY.**

Verde M, Franc MJ.

Translational Medicine, Università del Piemonte Orientale, Novara, Italy.

**INTRODUCTION:** Emergency Department (ED) surge capacity is defined as an ED's ability to rapidly expand normal services to meet increased demand during public health emergencies or disasters. There seems to be a general expectation that the care provided for adult patients is appropriate for children, but little research has identified whether the metrics used for adult ED flow also work for Paediatric ED patients. This study compared adult and paediatric surge capacity markers from a pre-existing database, in order to ensure that the existing benchmarks meet the requirements for effectively providing care to both child and adult disaster survivors.

**METHODS:** Length of stay (LOS) metrics (time to triage, room assignment, physician assessment, and disposition) recorded from over 12,000 simulated patients from 105 SurgeSim™ simulation exercises were analysed using linear regression to compare the linear model with and without adjustment for the paediatric age group. Difference between models was measured with ANOVA sum of squares.

**RESULTS:** A total of 12,843 simulated patients (mean age = 35.1 years) were recorded from 105 simulation exercises (10,676 adult patients, mean age = 41.7 years; 2,567 paediatric patients, mean age = 8.9 years). There was no significant difference in surge capacity LOS between the adult and paediatric group for any of the four measured metrics.

**CONCLUSIONS:** This study suggests that the age of disaster victims has no influence on the triage, bed assignment, physician assessment and disposition times. Consequently, it seems appropriate that the same metrics be used for both paediatric and adult hospital planning. This may mean a significant reduction of human and financial resources for training purposes as well as for drafting hospital MCI plans.

## **COMPUTED TOMOGRAPHY USE FOR HEADACHE PRESENTATIONS TO EMERGENCY DEPARTMENTS IN ALBERTA: REGIONAL, SITE AND PHYSICIAN LEVEL VARIATION.**

Krebs LD, Alexiu CJ, Villa-Roel C, Kirkland SW, Gaudet LA, Holroyd BR, Ospina M, Pryce C, Bakal J, Rowe BH.

Department of Emergency Medicine, University of Alberta, Edmonton, AB.

**INTRODUCTION:** Headaches are a common emergency department (ED) presentation. Evidence demonstrates that computed tomography (CT) imaging varies significantly within and across sites. This study explored CT ordering and variation among headache presentations across Alberta EDs.

**METHODS:** Administrative health data for Alberta were obtained from the National Ambulatory Care Reporting System (NACRS) for all adult (>17 years) headache (ICD-10-CA: G44, G43, R51) ED visits from 2011-2015. Patients with a primary or secondary diagnosis code of headache were included. Exclusions were: sites without CT scanners, Canadian Triage and Acuity Scale score of 1, patients with trauma or external mechanism of injury (e.g., ICD-10-CA S,T,V,W,X,Y), or enhanced/contrast CTs. NACRS data were linked with Alberta Health Services' (AHS) diagnostic imaging data. Preliminary analysis on imaging variation at the zone, ED site, and physician level was completed using SAS (v.9.4). Physicians who saw less than an average of 10 headache patients per year were excluded.

**RESULTS:** Overall, 98,804 headache presentations were recorded (~20,000/year; 8.5% average annual increase) in 30 EDs. The average proportion of visits receiving CT was 25.1% with an average 6.2% increase per year. CT ordering varied across AHS zones (Variation [V]:23%; range:9.6-32.7%). Site ordering variation was more dramatic (V:45%; range:1.4-46.5%). The greatest variation was observed among physicians (V:84 %; range:0.0-83.7%) with mean ordering proportion of 28.7%.

**CONCLUSIONS:** From 2011-2015, headache presentations and CT imaging for these patients in the ED increased. Substantial variation in CT ordering exists at multiple levels in Alberta. Further exploration of CT appropriateness is urgently needed.

## **DO CAREGIVERS REFUSE ANALGESIA IN THE PEDIATRIC EMERGENCY DEPARTMENT? A CROSS-SECTIONAL STUDY IN TWO CANADIAN CENTRES.**

Whiston C, Ali S, Wright RB, Wonnacott D, Stang AS, Thompson GC, Bhat C, Todorovich S, Mishra A, Laczko D, Poonai N.  
Department of Pediatrics, University of Alberta, Edmonton, AB.

**INTRODUCTION:** The suboptimal provision of analgesia to children in the emergency department (ED) is well-described. A yet unexplored barrier is caregiver or child refusal of analgesia. We sought to evaluate the frequency of caregiver/child acceptance of analgesia offered in the ED.

**METHODS:** We conducted a two-center cross-sectional study of 743 caregivers of children 4-17 years presenting to the pediatric ED with an acutely painful condition using a survey and medical record review. The primary outcome was the proportion of children/caregiver pairs who accepted analgesia in the ED.

**RESULTS:** The median (IQR) age of children was 11 (7) years and 339/743 (45.6%) were female. The overall survey response rate was 73% (743/1018). In the 24 hours preceding ED arrival, the median (IQR) maximal pain score rated by children and caregivers was 8/10 (4) and 5/10 (2), respectively and 30.4% (226/743) of caregivers offered analgesia. In the ED, children reported a median (IQR) pain score of 8/10 (2) and 54.9% (408/743) were offered analgesia. When offered in the ED, analgesia was accepted by 91% (373/408). Overall, 55.7% (414/743) of children received some form of analgesia.

**CONCLUSIONS:** Most caregivers/children accept analgesia when offered by ED personnel, suggesting refusal is not a major barrier to suboptimal management of children's pain and highlighting the importance of ED personnel in encouraging adequate analgesia. A large proportion of children in pain are not offered analgesia by caregivers or ED personnel. Educational strategies for recognizing and treating pain should be directed at children, caregivers, and ED personnel.



## **INSITU, MULTIDISCIPLINARY SIMULATION ENCOURAGES PROCESS CHANGE: A QUALITY IMPROVEMENT PROJECT.**

Mews L, Miazga S, Brown T, Tomlinson R, St Jean G, Odochartaigh D, Ma W and M Chan.

Department of Emergency Medicine, University of Alberta, Edmonton AB.

**INTRODUCTION:** Simulation has been gaining momentum over the years as a teaching strategy. It has become widely accepted as an alternative tool for knowledge acquisition, improving procedural skills, and enhancing communication strategies. As a secondary outcome, simulation has been found to detect system deficiencies, equipment failures, and conditions predisposing to medical errors, also known as latent safety threats (LST). In situ simulation (that is, simulation conducted within the actual clinical environment) creates a high pressure, more realistic teaching condition, consequently, it provides the opportunity to recognize system issues and latent safety errors (LSE). We conducted in situ, multidisciplinary simulations across nine of the twelve emergency departments in the Edmonton zone, as a part of a quality improvement project. During this simulation we were able to detect a multitude of LST that can now be addressed to improve patient safety.

**METHODS:** In 2015/16, a multi-disciplinary, in-situ simulation education intervention was piloted at nine hospital sites within the Edmonton Zone. During each education day, a simulation education team consisting of a nurse educator, emergency physician, and simulation technician travel to each participating community emergency department to facilitate the intervention. Following a pre-brief, three in-situ simulations are completed (each with a duration of 20min, followed by a 40 min debrief) at each site with the multidisciplinary team of learners/participants. Following each simulation, a cross sectional, survey based assessment tool, was given to each participant, giving them the opportunity to identify any system issues. We then did a retrospective analysis of the survey results to determine what LST were identified.

**RESULTS:** The most commonly identified LTS were; the availability and operating logistics of equipment, the need for new equipment, the discovery of the suboptimal location of medications or difficulty finding medications, the lack of familiarity and comfort with the broselow tape and pediatric dosing, and how important closed loop communication is.

**CONCLUSIONS:** Simulation can be used as an effective quality improvement tool to identify LST and improve patient safety. The results of this initial phase are the beginning of a larger scale project on quality improvement with the goal of improving patient safety. We plan to continue this project through the 2017/18 year, with a goal of illustrating that simulation not only identifies potential adverse events, but motivates change, and eventually, creates an opportunity to test the risk reduction strategies that have been implemented. Ultimately, we hope that this quality improvement strategy will improve patient safety.

**EMERGENCY DEPARTMENT DIRECTED MULTIFACETED INTERVENTIONS TO IMPROVE OUTCOMES AFTER ASTHMA EXACERBATIONS: A 3-ARMED RANDOMIZED CONTROLLED TRIAL.**

Villa-Roel C, Majumdar SR, Leigh R, Senthilselvan A, Bhutani M, Borgundvaag B, Lang E, Rosychuk RJ, Rowe BH.

Department of Emergency Medicine, University of Alberta, Edmonton, AB.

**INTRODUCTION:** Approximately 20% of Canadians who present to emergency departments (EDs) with acute asthma relapse within 4 weeks of discharge. The reasons are likely multi-factorial; however, the lack of timely primary care provider (PCP) follow-up and inadequate patient self-management are thought to be important variables. Therefore, we tested the effectiveness of ED-directed multifaceted interventions that targeted PCPs and enhanced patient self-management to reduce asthma relapse following ED discharge.

**METHODS:** Adults with acute asthma discharged from 6 Alberta EDs were randomly allocated, in a centralized and concealed manner, to receive usual care (UC), opinion leader [OL] guidance to their PCPs, or OL guidance + nurse case-management [OL+CM] for patients (NCT01079000). The main study outcome was asthma relapse within 90-days of ED discharge. Secondary outcomes included PCP visits, time to relapse, hospitalizations and asthma-related quality of life (QoL). Outcomes were collected independently and assessors were masked to intervention assignment.

**RESULTS:** From 943 screened patients, 367 patients were allocated to the study arms (UC = 146; OL = 110; OL+CM = 111). Median age was 28 years, 64% were women, median peak flow at discharge was 350 L/min, and 5% were receiving oral corticosteroids at ED presentation. Compared with UC, both interventions significantly *increased* rates of relapse at 90-days: UC=12%, OL=28%, OL+CM=19%; p=0.006). Based on an absolute increased risk of 0.16 (95% CI: 0.05, 0.25), the number needed to treat for harm was 6 (95% CI: 3.9, 19.0) for the OL arm. Across study differences in PCP follow-up visits, time to relapse, hospitalizations or asthma-related QoL were not identified.

**CONCLUSIONS:** Two different theory-informed and evidenced-based interventions intended to decrease asthma relapse robustly and significantly increased rates of relapse compared with UC. While the reasons for these unintended consequences require further study, we caution against the adoption of similar interventions by EDs.

## **EXPLORING THE EFFECTS OF EMERGENCY DEPARTMENT INTERVENTIONS ON DIAGNOSTIC IMAGING USE: A SCOPING REVIEW.**

Carr M, Krebs LD, Gaudet LA, Kirkland SW, Lepage R, Hall A, Mahoney K, Campbell S, Rowe BH.

Department of Emergency Medicine, University of Alberta; Edmonton, AB.

**INTRODUCTION:** Overuse of diagnostic imaging (DI) in the emergency department (ED) is a growing concern. While various interventions to reduce ED DI ordering have been introduced, their overall effectiveness is unclear. The objective of this scoping review was to identify and characterize interventions to reduce DI overuse and their respective effectiveness.

**METHODS:** Nine bibliographic databases and the grey literature were searched. Studies that reported on an intervention addressing ED care and reporting at least one change in imaging outcome were eligible for inclusion. At least two independent reviewers judged study relevance and inclusion. Data extraction was completed by one reviewer and checked for accuracy. Frequency counts were conducted.

**RESULTS:** The search returned 4472 unique citations, of which 137 articles were included. The majority of the studies were before-and-after designs (n=114), were conducted in North America (n=97), and were conducted in a single centre (n=95). The intervention utilized across the majority of studies was a clinical guideline/care pathway (71%) and only 22% of studies developed a multi-faceted intervention. Implementation details were provided in only half (51%) of the studies. The majority of the studies reported on changes in one DI modality (n=94), of which, 55% of studies reported a significant decrease in imaging, while 6% of studies reported a significant increase in imaging following the intervention. For studies that reported on multiple DI modalities (n=43), 44% of studies reported a significant decrease for a least one of the modalities.

**CONCLUSIONS:** Approximately 50% of studies reported a significant decrease in DI ordering. A systematic review is needed to identify effectiveness across studies and whether specific interventions and implementation strategies are more successful than others. Limited reporting on the intervention components and implementation strategies further complicates interpretation and replication of these studies.

## **OPTIMIZING THE TREATMENT OFFERED BY PARAMEDICS FOR PATIENTS WHO STRUGGLE WITH OPIOID USE DISORDER.**

Lobay KW.

Walter C. Mackenzie Health Sciences Centre, Edmonton, AB.

**INTRODUCTION:** There is increasing interest in optimizing the treatment offered by paramedics to patients who struggle with opioid use disorder. Driving this interest is a rapidly increasing incidence of opioid overdose-related deaths in Alberta over the past several years. Existing research seeking to understand best-practice therapy pays little attention to a role for paramedics in treatment. The goal of this paper is to understand and explore point of care therapies that paramedics in Alberta might employ when managing patients with opioid use disorder.

**METHODS:** Inductive Gioia methodology was employed to bring scholarly rigor and structure to this project. The Gioia method assumes that our organizational world is socially constructed, and that those who construct this world are “knowledgeable agents” who can explain their thoughts, intentions and actions. The perspectives of 17 relevant knowledgeable agents were gathered and organized into first order concepts, second order themes, and aggregate dimensions – core concepts that provide a foundation for understanding the role of paramedics in opioid use disorder management.

**RESULTS:** Four second order themes were identified as being important to this issue: *Alberta’s Emergency Medical System (EMS) environment, paramedics as professionals, providing therapy, and building partnerships*. Further, two aggregate dimensions emerge from these themes: *role clarity, and relationships*.

**CONCLUSIONS:** Several opportunities for practice change are identified both for front-line paramedics and their leadership. Alberta’s paramedic leadership must prioritize developing a strategy that (1) clearly identifies a role for paramedics in our provincial response to opioid use disorder, (2) supports paramedics through training and resources, and (3) builds partnerships with other agencies with expertise in opioid use disorder therapy.

## **ADDICTION MEDICINE TRAINING IN CANADIAN EMERGENCY MEDICINE RESIDENCY PROGRAMS: A NEEDS ASSESSMENT SURVEY.**

Olmstead A, Hann J, Gupta S, Jaggi P, Dong K, Ha D.

Department of Emergency Medicine, University of Alberta, Edmonton, AB.

**INTRODUCTION:** Emergency department visits related to substance use are becoming more serious and increasingly costly in Canada. Emergency physicians must be able to effectively screen, manage, refer, and advocate for these complex patients. This study sought to describe the current state of addiction medicine training in Canadian emergency medicine (EM) residency programs and to assess the need for a formal curriculum.

**METHODS:** All Royal College and College of Family Physicians EM Program Directors (PDs) were asked to participate in a ten-question needs assessment survey on addiction medicine training for residents. Questions were developed through consensus after reviewing the relevant literature and conducting a formal pilot survey with staff physicians experienced in survey methodology. Responses were collected securely using the Research Electronic Data Capture (REDCap) database.

**RESULTS:** 19 out of 31 (62%) eligible PDs completed the survey. The importance of addiction medicine training received a median score of 69.5 (IQR=74.0) on a scale of 1-100. Most programs devoted two hours or less per year of formalized teaching on individual topics (such as opioids, alcohol, harm reduction) over the past two academic years. The two most common teaching modalities used were didactic lectures (15/19, 78.9%) and case-based tutorials (12/19, 63.2%). Case-based tutorials were identified as the most effective teaching method (12/19, 63.2%). Topics highlighted as most important to include in a curriculum were: screening for substance use disorders and referral for further treatment (14/19, 73.7%), social determinants of health (14/19, 73.7%), alcohol, opioid, and stimulant intoxication and/or withdrawal (14/19, 73.7% each), and management of patients on opioid agonist therapy (14/19, 73.7%). The most commonly perceived barriers to implementing such a curriculum were insufficient curriculum time (10/19, 52.6%) and lack of qualified teaching staff (7/19, 36.8%).

**CONCLUSIONS:** This needs assessment provides an understanding of the current state of addiction medicine training for EM residents in Canada. A case-based addiction medicine workshop is currently being developed to address identified curriculum gaps. Integrating this curriculum longitudinally into a time-constrained academic schedule is an important next step.

## **EMERGENCY DEPARTMENT PATIENT VALUES: A DISCRETE CHOICE EXPERIMENT.**

Sran MS, Ward J, McCabe C, Chen L, Pyra T, Holroyd BR.

Department of Emergency Medicine, University of Alberta, Edmonton, AB.

**INTRODUCTION:** This study was undertaken to explore patient values in the emergency department (ED) using a discrete choice experiment. Understanding patient preferences for attributes of their emergency treatment will help inform clinicians and policy-makers alike with the ultimate goal of improving patient-centered care.

**METHODS:** A discrete choice survey was administered to a convenience sample of 250 adult patients attending the ED waiting room of the University of Alberta Hospital. Subjects were asked to evaluate 8 choice sets between 2 hypothetical EDs, each consisting of 7 characteristics. Data was analyzed using the multinomial logit model to elicit the relative preferences for the characteristics of interest. Further econometric analysis was conducted to estimate the probabilities of uptake and the willingness to increase length of stay.

**RESULTS:** 229 participants underwent analysis after assessing for internal consistency of responses. All attributes had a statistically significant impact on the utility that an individual has for the ED. Treatment effectiveness showed the largest magnitude of utility, however process attributes of communication, empathy, and length of stay also had large effects on an individual's ED preference.

**CONCLUSIONS:** This study provides evidence to the suitability of discrete choice experiments in evaluating patient preferences for ED health care delivery. While treatment effectiveness was of the highest importance, no single domain of the ED patient experience dominated all other domains. The results of this experiment support the adoption of a multi-faceted approach to improving patient experience in the ED.

## **A SCOPING REVIEW OF LAY-PERSON RESPONSE GUIDELINES TO LIFE-THREATENING OPIOID TOXICITY: A PUBLIC HEALTH CONTROVERSY.**

Douma MJ.

Royal Alexandra Hospital Emergency Department, Edmonton, AB.

Collaborative Program Resuscitation Science, University of Toronto, Toronto ON.

**INTRODUCTION:** Over the past two decades, morbidity and mortality from opioids has risen sharply, becoming a public health emergency. Canada has the second highest per capita prescription opioid consumption in the world. How lay responders to opioid toxicity are directed to respond by public health, emergency medicine, emergency medical dispatch and public life support guidelines is often conflicting. This research illustrates the differences and controversies in published guidelines and recommendations.

**METHODS:** A scoping review methodology was employed using the six-stage iterative process advocated by Arksey and O'Malley (2005) and Levac et al. (2010). Searches used key words and terms such as 'lay-responder'; 'bystander'; 'lay-rescuer'; 'opioid-overdose'; 'opioid-toxicity'; 'life-support guideline'; 'first aid'; and 'peer-responder'. Appropriate search terms were selected for each database. After initial exploratory searches, comprehensive searches were conducted with Cochrane Database of Systematic Reviews, Medline, Medline in Process, Embase, PsycINFO, Google Scholar and CINAHL. Eligibility criteria centered on whether studies broadly described how the lay-person should respond to an opioid-related life-threatening event.

**RESULTS:** The search identified 95 articles, of which 16 prescribed a lay-person response procedure. Five themes emerged after initial review of the data; 'Opioid potency and time to deterioration'; 'The ability to recognize the event'; 'Which intervention to prioritize'; 'Utilitarianism'; and 'A disconnect between public health and resuscitation.

**CONCLUSIONS:** Findings from this scoping review suggest that there is disagreement as to whether lay-responders to life-threatening opioid toxicity should provide rescue breaths, chest compressions or both. It is unclear how naloxone should be administered. Guidelines may differ regionally based on the prevalence of high versus low potency opioids. The ability of lay-persons to recognize the life-threatening event remains controversial. Existing strengths and commonalities include activation of the emergency response system, naloxone administration and messaging that deaths are preventable.



## **RESUSCITATIVE ENDOVASCULAR BALLOON OCCLUSION OF THE AORTA (REBOA) IN TRAUMA: A SYSTEMATIC REVIEW.**

Archer C, Odenbach J, Eksteen A, Domke C.

Department of Emergency Medicine, University of Alberta, Edmonton, AB.

**INTRODUCTION:** Trauma leading to uncontrolled hemorrhage of the torso in the critically injured patient can rapidly progress to decreased cerebral and cardiovascular perfusion and carries a significant morbidity and mortality. Given the non-compressible nature and difficult anatomic access of these injuries, obtaining hemostasis is often a challenge and non-surgical options are sparse. Resuscitative Endovascular Balloon Occlusion of the Aorta (REBOA) is a rapidly administered emergency department intervention that allows transient source control of caudal torso hemorrhage while arranging definitive surgical management. Although initially postulated in the 1950s, limited research regarding its therapeutic use in trauma has been available until recently. Here, we present a systematic review of the literature pertaining to the use of REBOA in severe trauma.

**METHODS:** An experienced medical librarian searched electronic databases for terms relating to REBOA, aortic balloon occlusion, hemorrhage, trauma and shock. Articles were identified, screened, retrieved and reviewed in accordance with PRISMA systematic review guidelines. English case reports, case series, cohort studies, randomized-controlled trials, systematic reviews and meta-analyses pertaining to the use of REBOA in human trauma patients were included. Customized inclusion and data extraction forms were created and used to form an electronic database of relevant studies.

**RESULTS:** After exclusion of duplicates, 2147 potentially relevant articles were identified and screened by title/abstract and 136 articles meeting inclusion criteria were retrieved for full-text review. Final analysis of 26 articles included 5 case reports, 13 case series, 7 observational cohort studies and 1 systematic review. Data spanning 771 patients undergoing REBOA were collected (weighted average age: 49.5, gender: 67.7% male, injury severity score: 35.1). Where data available, REBOA increased systolic blood pressure by a weighted average of 54.7mmHg and overall survival was 32.6%.

**CONCLUSIONS:** Limited evidence pertaining to the use of REBOA in severe trauma exists with the majority of available data coming from individual case studies and case series. By extension, quantitative analysis regarding outcome data of this intervention requires further research in the form of larger studies with subgroup analysis to identify the subset of patients for which REBOA may benefit and to further delineate the risks of implementing this intervention.



## **A SYSTEMATIC REVIEW OF THE PSYCHOMETRIC PROPERTIES AND DIAGNOSTIC PERFORMANCE OF INSTRUMENTS TO IDENTIFY MENTAL HEALTH AND SUBSTANCE USE PROBLEMS AMONG CHILDREN IN THE EMERGENCY DEPARTMENT.**

Kirkland SW, Soleimani A, Gokiart RJ, Newton AS.

Department of Pediatrics, Department of Emergency Medicine, Faculty of Extension, University of Alberta, Edmonton, AB.

**INTRODUCTION:** The objective of this systematic review was to investigate the psychometric properties and diagnostic performance of instruments used in the emergency department to identify pediatric mental health and substance use problems.

**METHODS:** A search of seven electronic databases and the grey literature was conducted. Studies assessing any instrument to identify and or diagnose mental illness, emotional or behavioural problems, or substance use disorders in pediatric patients with presentations for mental health or substance use issues were considered eligible for inclusion. Two independent reviewers judged the relevance and study quality of the studies. A descriptive analysis of the outcomes was reported.

**RESULTS:** From 4832 references, 14 studies were included. Eighteen instruments were evaluated for identifying suicide risk, alcohol use disorders, mood disorders, and ED decision-making. The HEADS-ED has good inter-rater reliability ( $r=0.785$ ) for identifying general mental health problems and modest evidence for ruling out patients requiring hospital admission (positive likelihood ratio,  $LR^+=6.30$ ). The internal consistency varied for tools to screen for suicide risk ( $\alpha=0.46-0.97$ ); no tools have both high sensitivity and high specificity. The Ask Suicide-Screening Questionnaire (ASQ) is highly sensitive (98%) and provides strong evidence to rule out risk (negative likelihood ratio,  $LR^-=0.04$ ). Among tools to screen for alcohol use disorders, a two-item tool based on DSM-IV criteria was found to be the most accurate in identifying patients with a disorder (area under the curve: 0.89), and has modest evidence to rule in and rule out risk ( $LR^+=8.80$ ,  $LR^-=0.13$ ).

**CONCLUSIONS:** Reliable, valid, and accurate instruments are available for use with pediatric mental health ED visits. Based on available evidence, emergency care clinicians are recommended to use the HEADS-ED to rule in ED admission, ASQ to rule out suicide risk, and DSM-IV two-item tool to rule in/rule out alcohol use disorders.

## VARIATION IN ALBERTA EMERGENCY DEPARTMENT PATIENT POPULATIONS.

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**INTRODUCTION:** With increasing pressures on the Canadian health care system, and specifically in emergency departments (EDs), there is a need to understand the characteristics of, and changes in acuity and volume of ED patients, as well as their associated emergency care and resource utilization. This knowledge will allow identification of gaps in non-ED care, and opportunities for system change, in addition to supporting improvement in ED quality and efficiency. The goal of this program of research is to analyze ED utilization, as well as its variation in Alberta (AB). The initial analysis provides an overview of the AB patients seeking ED care.

**METHODS:** Alberta Health Services (AHS) administrative databases, including National Ambulatory Care Reporting System (NACRS) data, the preceding 3 years of Aggregated Episode Disease Categories (EDCs), ED Admission/Discharge/Transfer (ADT) data, Comprehensive Ambulatory Care Classification System (CACS) codes, Resource Intensity Weights (RIW), as well as clinical laboratory and diagnostic imaging data related to each ED visit, were linked for all ED patient visits in AB during FY 2013-14. AB EDs were categorized based on AHS determined definitions. ED Data was linked with 2011 Canada census data as a proxy for socioeconomic status of ED patients. Patient identifiers were removed and replaced with a unique, non-identifying patient number in order to maintain differentiation of individual patients.

**RESULTS:** In FY 2013-14 in AB (population 4,087,296), there were 2,142,629 patient visits (8.3% admitted), distributed among 100 EDs. Overall, 50.9% of ED visits occurred at suburban and rural EDs (4.2% admitted), with 12.4% of ED visits at teaching hospitals (16% admitted). Patients  $\leq 17$  years accounted for 20.1% of ED visits with 3.3% of them being admitted, while those  $\geq 80$  years accounted for 5.8% of ED visits with 29.2% of them admitted. There is a clinically and statistically significant difference between ED types as reflected by CTAS score, patient disposition, and CACS ( $p < 0.05$ ).

**CONCLUSIONS:** Variation is demonstrated in the characteristics of patients presenting to different ED types in AB. Further investigations are needed to define the variation in these characteristics, the ED care provided for the patients, the associated implications on ED resource utilization and allocation, to identify the optimal metrics to describe ED case-mix, and hence allocate limited healthcare resources appropriately.

## Poster Presentations

### **ACUTE ASTHMA PRESENTATIONS TO EMERGENCY DEPARTMENTS IN ALBERTA: AN EPIDEMIOLOGICAL ANALYSIS OF PRESENTATIONS.**

Alexiu CJ, Krebs LD, Villa-Roel C, Holroyd BR, Ospina M, Pryce C, Bakal J, Jelinski SE, Innes G, Lang E, Rowe BH.

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**INTRODUCTION:** Asthma is a chronic condition and exacerbations are a common reason for emergency department (ED) presentations across Canada. The objective of this study was to characterize and describe acute asthma presentations over a five-year period.

**METHODS:** Administrative health data for Alberta from 2011-2015 was obtained from the National Ambulatory Care Reporting System (NACRS) for all adult (>17 years) acute asthma (ICD-10-CA: J45) ED presentations. All presentations to an Alberta ED with a primary or secondary diagnosis of acute asthma were eligible for inclusion. Presentations with a Canadian Triage and Acuity Scale (CTAS) score of 1 were excluded. Data from NACRS were linked with a provincial diagnostic imaging database. Data are reported as means and standard deviation (SD), medians and interquartile range (IQR) or proportions, as appropriate.

**RESULTS:** From 2011-2015, a total of 51,269 (~10,000/year) acute asthma presentations were made by 34,481 patients (~0.3 presentations per patient per year). The median age was 35 years (IQR: 25, 49 years) and more patients were female (57.2%). Few patients arrived to the ED by ambulance (6.5%) and the most frequent CTAS score was 3 (43.5%). The majority of these patients (77%) had a primary diagnosis of asthma in the ED. Differences were explored between those with a primary asthma diagnosis and those with a secondary diagnosis (e.g., ambulance arrival, length of stay, hospital admission, etc.). Although differences were statistically significant, no clinically relevant differences were identified. Patients with asthma most frequently had a co-diagnosis of acute upper respiratory infection (6.2%); other co-diagnoses included bronchitis (4.7%), pneumonia (3.7%), heart failure (0.18%), pulmonary embolism (0.15%), and pneumothorax (0.03%). For 39.3% of patients, ED management included chest x-ray. The majority of patients were discharged from the ED (92.2%) following a median length of stay of 2.2 hours (IQR: 1.2, 3.8 hours).

**CONCLUSION:** Acute asthma remains an important ED presentation in Alberta and the absolute frequency of presentations has remained relatively stable over the past five years. Frequency of chest x-ray ordering is high and represents a target for future interventions to reduce ionizing radiation exposure, improve patient flow and reduce healthcare costs.

## **CONSULTATIONS IN THE EMERGENCY DEPARTMENT: A SYSTEMATIC REVIEW.**

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**INTRODUCTION:** Consultation in the emergency department (ED) is a common component of emergency health care. Consultation is defined as a case in which an ED physician (EP) requests the services of another physician (consultant) for an ED patient to assist, advise, and/or transfer care when the care required is beyond the expertise of the EP's practice. While consultation is generally considered required and beneficial for patient care, consultation can also have a negative impact by incurring delays in patient flow and disposition. These delays contribute to ED crowding, patient dissatisfaction and, in some cases, worse health outcomes. Using an a priori protocol and accepted methodology, the aim of this systematic review was to update a previous review on the same topic and determine the proportion of 1) ED visits that involve consultation and 2) consultation cases that result in admission. PROSPERO registration number: CRD42017054054.

**METHODS:** Literature search involved multiple electronic databases (e.g., MEDLINE and EMBASE) and grey literature (e.g., Google Scholar and conference abstracts). Study selection was conducted independently by two reviewers and determined by consensus among the two reviewers with disagreements resolved by a third party. Data extraction was conducted independently by two reviewers and determined by consensus among the two reviewers with disagreements resolved by a third party. A descriptive analysis was conducted. Outcome measure data were aggregated and reported with suitable descriptive statistics such as raw or weighted mean, median, or proportion with 95% confidence interval.

**RESULTS:** Literature search yielded 1,584 studies, of which 65 were included. Two-thirds of studies were conducted in USA or Canada. Of the 65, 54 were focused on a particular patient group or consulting specialty (e.g., psychiatry) while 11 considered the general ED population. Of these 11, the median proportion of ED visits involving consultation was 26%. The median proportion of cases with consultation that resulted in admission was 60%.

**CONCLUSION:** Consultations in the ED are quite common and many of these cases result in admission. Given their frequency of occurrence and increasing ED crowding, efforts to reduce consult delays and expedite disposition appear warranted.

## **ACUTE FATAL NITROFURANTOIN-INDUCED LIVER FAILURE: A CASE REPORT.**

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**INTRODUCTION:** Nitrofurantoin is recommended as a first-line treatment of uncomplicated urinary tract infection by some guidelines. It has been implicated in hypersensitivity-type pulmonary and hepatic drug reactions. We report a fatal case of nitrofurantoin-induced liver failure in a patient with repeat nitrofurantoin exposure.

**CASE REPORT:** A 68-year-old lady presented to hospital with new onset jaundice, anorexia and malaise. Past medical history was significant for hypertension, dyslipidemia, GERD and recurrent cystitis. She had recently been started on nitrofurantoin for recurrent cystitis. On admission, she had stable vital signs. Initial investigations revealed a bilirubin 292  $\mu\text{mol/L}$  (0-24  $\mu\text{mol/L}$ ), AST of 861 U/L (8-32 U/L), Alkaline Phosphatase 307 U/L (30-145 U/L), LDH 1396 U/L (100-235 U/L), GGT 1059 U/L (8-35 U/L) and ALT 686 U/L (1-40 U/L). Lipase, urea, creatinine and electrolytes were within normal ranges. Imaging and immune assays did not reveal an etiology of her liver failure. Subsequent liver biopsy showed chronic hepatitis with mixed cellularity, with foci of bile duct epithelial injury and cholestasis, thought to favor the diagnosis of drug induced liver injury. The patient was started on prednisone and showed some improvement initially.

**RESULTS:** She was discharged with hepatology follow-up, but re-presented 6 days after discharge home with worsening cholestasis and developed multi-organ system failure, including respiratory failure requiring intubation. Despite aggressive supportive measures such as IV fluids, antibiotics and vasopressors, she continued to deteriorate and died 30 days after initial presentation.

**CONCLUSIONS:** Drug induced liver injury is recognized to occur rarely in response to nitrofurantoin exposure. A recent study suggests that this phenomenon may be underestimated, and reported an incidence of 73 cases per 100,000. Mortality in these patients is estimated at 8-10%. Nitrofurantoin induced liver injury may be acute or chronic. The mechanism of this reaction is not fully understood but it is thought to be an immune hypersensitivity reaction partially mediated by CD8+ cells. Specific risk factors include the geriatric population and female sex. However, these may be confounding factors given that recurrent urinary tract infections are found predominantly in the same population.

## **AIRWAY, BREATHING, CIRCULATION...GOOGLE: AN EXPLORATION OF GOOGLE SEARCH QUERIES RELATED ON “CARDIAC ARREST” AND “CARDIOPULMONARY RESUSCITATION”.**

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Collaborative Program Resuscitation Science, University of Toronto, Toronto ON.

**INTRODUCTION:** Three and a half billion internet searches occur daily. Ninety percent of online searching occurs on Google. Internet searching is the most common form of health information seeking behaviour. This study uses Google Trends search data to describe and analyse online search behaviour offering insight for resuscitation scientists, educators, and policy makers.

**METHODS:** Google Trends was interrogated from January 1, 2004 to December 31, 2016 using the search topics “CPR” and “cardiac arrest” worldwide and within Australia, Canada, the United Kingdom and the United States. For comparison, additional health-related searches on acetaminophen, arthritis and breast cancer were performed. To provide additional context, popular culture searches were performed combining resuscitation topics with popular sports teams and television shows. Results are provided in relative search volume and descriptive statistics are provided.

**RESULTS:** The search terms used to return information on CPR and cardiac arrest varied considerably between Australia, Canada the United Kingdom and the United States. Per-capita search volumes for cardiac arrest are highest in Indonesia, Philippines and Peru. Seasonal variation was more pronounced in Canada and the United States than Australia and the United Kingdom. Large spikes (over three-fold increases) in search volumes for cardiac arrest coincide with notable celebrity deaths. Resuscitation related search terms constitute a profound minority of internet search volume when compared to general medical and popular culture search topics.

**CONCLUSIONS:** Search behaviour varies by country, time of year, and celebrity events (media and social media coverage). These local, temporal, and cultural factors need to be understood and monitored to tailor resuscitation information for those who seek it. Monitoring of Google Trends by resuscitation scientists offers an opportunity to leverage high-profile events, and to discover what topics resonate with the public. The goal should be to engage, to inform, and to allow everybody to maximize the chain-of-survival.

## **DIAGNOSIS FOR MILD TRAUMATIC BRAIN INJURY IN THREE CANADIAN EMERGENCY DEPARTMENTS: MISSED OPPORTUNITIES.**

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**INTRODUCTION:** Patients with mild traumatic brain injury (mTBI) often present to the emergency department (ED). Incorrect diagnosis may delay appropriate treatment and recommendations for these patients, prolonging recovery. Notable proportions of missed mTBI diagnosis have been documented in children and athletes, while diagnosis of mTBI has not been examined in the general adult population.

**METHODS:** A prospective cohort study was conducted in one academic (site 1) and two non-academic (sites 2 and 3) EDs in Edmonton, Canada. On-site research assistants enrolled adult (>17 years) patients presenting within 72 hours of the injury event with clinical signs of mTBI and Glasgow comma scale score  $\geq 13$ . Patient demographics, injury characteristics, and ED flow information were collected by chart review. Physician-administered questionnaires and patient interviews documented the recommendations given by emergency physicians at discharge. Bi-variable comparisons are reported using Pearson's chi-square tests, Student's t-tests or Mann-Whitney tests, as appropriate. Multivariate analyses were performed using logistic regression methods.

**RESULTS:** Overall, 130/250 enrolled patients were female, and the median age was 35. Proportions of successfully diagnosed mTBI varied significantly across study sites (Site 1: 89%; Site 2: 73%, Site 3: 53%;  $p > 0.001$ ). Patients without a diagnosis were less likely to receive a recommendation to follow-up with their family physician (OR=0.08; 95% CI: 0.03, 0.21) or advice about return to work (OR=0.17; 95% CI: 0.08, 0.04) or physical activity (OR=0.08; 95% CI: 0.04, 0.17). Patients with missed diagnoses had longer ED stays (median=5.0 hours; IQR: 3.8, 7.0) compared with diagnosed mTBI patients (median=3.9 hours; IQR: 3.0, 5.3). In the adjusted model, patients presenting to nonacademic centers had reduced likelihood of mTBI diagnosis (Site 2: OR=0.21; 95% CI: 0.08, 0.58; Site 3: OR=0.07; 95% CI: 0.02, 0.24).

**CONCLUSIONS:** The diagnostic accuracy of physicians assessing patients presenting with symptoms of mTBIs to these three EDs is suboptimal. The rates of missed diagnosis vary among EDs and were associated with length of ED stay. Closer examination of institutional factors, including diagnosis processes and personnel factors such as physician training, is needed to identify effective strategies to heighten the awareness of mTBI presentations.



## **NURSING DUTIES AND ACCREDITATION STANDARDS AND THEIR IMPACTS: THE NURSING PERSPECTIVE.**

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**INTRODUCTION:** With ongoing medical advances and an increase in elderly and complex patients presenting to the Emergency Department (ED), there is a requirement for nurses to continue to gain new knowledge and skills to provide optimal patient care. Quality initiatives are frequently introduced with the goal of improving patient safety and the effectiveness of care delivery; some being provincial, while others are new requirements from Accreditation Canada. We sought the perspectives of emergency nurses regarding the importance of key ED processes and standards, and their impact on patient care and nurse efficiency.

**METHODS:** All Registered Nurses and Licensed Practical Nurses throughout the Edmonton Zone EDs were invited to complete an online survey consisting of 23 statements on nursing attitudes (10 on nursing duties) and beliefs (11 on the importance of Accreditation standards and their impacts; two that involved selecting the 5 most important nursing activities). The survey was constructed through an iterative approach. Response options included a 7-point Likert scale (‘very strongly disagree’ to ‘very strongly agree’). Median scores and interquartile ranges were determined for each survey statement.

**RESULTS:** A total of 433/1241 (34.9%) surveys were submitted. Respondents were predominantly Registered Nurses (91.4%), female (88.9%), and worked 0-5 years overall in the ED (43.7%). Overall, respondents were favourable (‘agree’ or ‘strongly agree’) towards the Accreditation Canada standards and other quality initiatives. They were, however, ‘neutral’ towards universal domestic violence screening, and whether there is a difference between Best Possible Medication History (BPMH) and med reconciliation. The top five nursing activities in terms of perceived importance were: vital sign documentation, recording of allergies, listening to patients’ concerns, hand hygiene, and obtaining a complete nursing history. These were followed by Best Possible Medication History and the screening risk tools.

**CONCLUSION:** Despite their heavy workload, nurses strongly agreed on the importance of med reconciliation, falls risk, and skin care, but felt that improved documentation forms could support efficiency. Nursing perspective is valuable in informing future attempts to standardize, streamline, and simplify documentation, including the design and implementation of a provincial clinical information system.



## **MIXED EFFECTIVENESS OF EMERGENCY DEPARTMENT DIVERSION STRATEGIES: A SYSTEMATIC REVIEW.**

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**INTRODUCTION:** Diverting patients away from the emergency department (ED) has been proposed as a solution for reducing ED overcrowding. The objective of this systematic review is to examine the effectiveness of diversion strategies designed to either direct patients seeking care at an ED to an alternative source of care.

**METHODS:** Seven electronic databases and grey literature were searched. Randomized/controlled clinical trials and cohort studies assessing the effectiveness of pre-hospital and ED-based diversion interventions with a comparator were eligible for inclusion. Two reviewers independently screened the studies for relevance, inclusion, and risk of bias. Intervention effects are reported as proportions (%) or relative risks (RR) with 95% confidence intervals (CI). Methodological and clinical heterogeneity prohibited pooling of study data

**RESULTS:** From 7306 citations, ten studies were included. Seven studies evaluated a pre-hospital diversion strategy and three studies evaluated an ED-based diversion strategy. The impact of diversion on subsequent health services was mixed. One study of paramedic practitioners reported increased ED attendance within 7 days (11.9% vs. 9.5%;  $p=0.049$ ) but no differences in return visits for similar conditions (75.2% vs. 72.1%;  $p=0.64$ ). The use of paramedic practitioners was associated with an increased risk of subsequent contact with health care services (RR=1.21, 95% CI 1.06, 1.38), while the use of deferred care was associated with no increase in risk of subsequently seeking physician care (RR=1.09, 95% CI 0.23, 5.26). While two studies reported that diverted patients were at significantly reduced risk for hospitalization, two other studies reported no significant differences between diverted or standard care patients.

**CONCLUSIONS:** The evidence regarding the impact of pre-hospital and ED-based diversion on ED utilization and subsequent health care utilization is mixed. Additional high-quality comparative effectiveness studies of diversion strategies are required prior to widespread implementation.

**CHOOSING WISELY IN THE EMERGENCY DEPARTMENT: EXPLORING THE REACH, SUPPORT, AND POTENTIAL FOR THE CHOOSING WISELY CANADA® CAMPAIGN AMONG EMERGENCY PHYSICIANS.**

Krebs LD, Chartier L, Holroyd BR, Dowling S, Cheung AHY, Villa-Roel C, Campbell S, Couperthwaite S, Rowe BH.

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**INTRODUCTION:** Choosing Wisely Canada® (CWC) launched in April 2012. Since then, the Emergency Medicine (EM) top-10 list of tests, treatments and procedures to avoid has been released and initiatives are on-going. This study explored CWC awareness and support among emergency physicians.

**METHODS:** A 60-question online survey was distributed to Canadian Association of Emergency Physicians (CAEP) members with valid e-mails. The survey collected information on demographics, awareness/support for CWC as well as physicians' perceived barriers and facilitators to implementation. Descriptive statistics were performed in SPSS (Version 24).

**RESULTS:** Overall, 324 surveys were completed (response rate: 18%). Respondents were more often male (64%) and practiced at academic/tertiary care hospitals (56%) with mixed patient populations (74%) with annual ED volumes of >50,000 (70%). Respondents were familiar with campaigns to improve care (90%). Among these respondents, 98% were specifically familiar with CWC and 73% felt these campaigns assisted them in providing high-quality care. Respondents felt that the top-5 EM recommendations were supported by high quality evidence, specifically the first 4 recommendations (>90% each). The most frequently reported barriers to implementation were: patients' expectations/requests (33%), the possibility of missing severe condition(s) (20%), and requirements of ED consultations (12%). Potential facilitators were identified as: strong evidence-base for recommendations (37%), medico-legal protection for clinicians who adhere to guidelines (13%), and support from institutional leadership (11%).

**CONCLUSION:** CWC is well-known and supported by emergency physicians. Despite the low response rate, exploring the barriers and facilitators identified here could enhance CWC's uptake in Canadian emergency departments.

## **EXPLORING DEFINITIONS OF “UNNECESSARY CARE” IN EMERGENCY MEDICINE: A QUALITATIVE ANALYSIS OF PHYSICIAN SURVEY RESPONSES.**

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**INTRODUCTION:** Recently, campaigns placing considerable emphasis on improving emergency department (ED) care by reducing unnecessary tests, treatments, and/or procedures have been initiated. This study explored how Canadian emergency physicians (EPs) conceptualize unnecessary care in the ED.

**METHODS:** An online 60-question survey was distributed to EP-members of the Canadian Association of Emergency Physicians (CAEP) with valid emails. The survey explored respondents awareness/support for initiatives to improve ED care (i.e., reduce unnecessary tests, treatments and/or procedures) and asked respondents to define “unnecessary care” in the ED. Thematic qualitative analysis was performed on these responses to identify key themes and sub-themes and explore variation among EPs definitions of unnecessary care.

**RESULTS:** A total of 324 surveys were completed (response rate: 18%); 300 provided free-text definitions of unnecessary care. Most commonly, unnecessary ED care was defined as: 1) performing tests, treatments, procedures, and/or consults that were not indicated or potentially harmful ( $n=169$ ) and/or 2) care that should have been provided within a non-emergent context for a non-urgent patient ( $n=143$ ). Emergency physicians highlighted the role of system-level factors and system failures that result in ED presentations as definitions of unnecessary care ( $n=69$ ). They also noted a distinction between providing necessary care for a non-urgent patient and performing inappropriate/non-evidenced based care. Finally, a tension emerged in their description of frustration with patient expectations ( $n=17$ ) and/or non-ED referrals ( $n=24$ ) for specific tests, treatments, and/or procedures. These frustrations were juxtaposed by participants who asserted that “in a patient-centred care environment, no care is unnecessary” (Participant 50;  $n=12$ ).

**CONCLUSIONS:** Variation in the definition of unnecessary ED care is evident among EPs and illustrates that EPs’ conceptualization of unnecessary care is more nuanced than current campaigns addressing ED care improvements represent. This may contribute to a perceived lack of uptake or support for these initiatives. Further exploring EPs perceptions of these campaigns has the potential to improve EP engagement and influence the language utilized by these programs.

**EVALUATING THE COST-EFFECTIVENESS OF MONITORING TESTS.**

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**INTRODUCTION:** A monitoring test is a test that is repeated in a patient over a period of time to identify changes in the patient's medical status. In this study, we evaluate the cost-effectiveness of monitoring tests.

**METHODS:** We generalize on the existing literature for modelling the cost-effectiveness of monitoring tests in three ways: 1. We allow the test to be administered repeatedly for more than two periods; 2. In addition to the "monitoring testing" strategy, we incorporate a "wait" strategy in which both test and treatment are skipped, as well as a "treat" strategy in which patients are treated without testing; and 3. We adopt a global optimization approach where optimal decisions for each period of a monitoring regime are determined depending on the proceeding periods. We illustrate with a numerical example using data from a Ca125 test for monitoring ovarian cancer.

**RESULTS:** The results from this study show that the net health benefits from the monitoring test and the treatment will be maximized by finding globally optimal solutions in each period in comparison to the following two alternatives: Locally optimal solutions, where optimal test cut-offs in each period are determined independent of the proceeding periods and conventionally optimal solutions, where a fixed cut-off is chosen for all periods.

**CONCLUSIONS:** Optimal test cut-offs in a monitoring regime are population case-mix and health system specific and should not be assumed to be portable. To assume portability is to reduce the population health impact (value) of test technologies.

## **GOALS OF CARE FOR CONTINUING CARE RESIDENTS ASSESSED BY AN EMS URGENT RESPONSE TEAM: A RETROSPECTIVE OBSERVATIONAL STUDY.**

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**INTRODUCTION:** Goals of Care Designations (GCDs) guide Alberta's healthcare providers regarding a patient's desired aggressiveness of medical therapy. Alberta Health Services Emergency Medical Services (AHS EMS) recently introduced an "EMS Continuing Care Urgent Response Team" (ECCURT), which assesses and manages patients residing in Supportive and Facility Living in Edmonton. This study will determine (1) the prevalence of Goals of Care documentation among patients who are assessed by ECCURT, and (2) whether there is an association between the desired aggressiveness of therapy and frequency of transfer to hospital.

**METHODS:** This is a six-month retrospective, observational study of patient data. All new patients assessed by ECCURT between 1-Jan-2016 and 30-June-2016 are included. Statistical analysis was performed using Microsoft Excel to determine whether a correlation exists between GCD and frequency of transfer, and whether this correlation is statistically significance ( $p$ -value  $< 0.05$ ).

**RESULTS:** 471 of 567 (83%) of new patients assessed by ECCURT had established GCD in place. Mean frequency of transport to hospital was 16.67%, implying that most patients are manageable by ECCURT on-site. All patients with a GCD score of C2 (requesting no transport to hospital) were managed on-site, but there was otherwise a poor correlation between GCD and frequency of transfer ( $r = -0.69$ ). This relationship was not statically significant (F-statistic 0.085).

**CONCLUSIONS:** Aside from those patients who specifically request not to be transferred to hospital, our data does not show a statistically significant correlation between GCD and frequency of transfer to hospital. We therefore suggest that although GCD may be useful in guiding aggressiveness of medical therapy, scores other than C2 are not useful in guiding transport decision-making for EMS Urgent Response Teams.

## **EDUCATION AND TRAINING ON MILD TRAUMATIC BRAIN INJURY AMONG EMERGENCY DEPARTMENT PHYSICIANS: A SYSTEMATIC REVIEW.**

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**INTRODUCTION:** Mild traumatic brain injury (mTBI) is the most common emergency department (ED) brain injury presentation in Canada; however, an evidence-practice gap in mTBI management exists among ED physicians, evidenced by significant practice variation. This review aimed to identify mTBI education and training directed at ED physicians and its relationship with practice patterns and physician knowledge.

**METHODS:** A comprehensive literature search of four bibliographic databases and the grey literature was performed using the keywords: concussion, mTBI, medical education, and continuing medical education. Included studies were required to report on mTBI education received by practicing ED physicians. Two independent reviewers screened unique citations for relevance and reviewed the full-texts of relevant articles. Two independent reviewers assessed methodological quality using the Methodological Index for Non-Randomized Studies. Data were extracted in duplicate onto standardized forms. Throughout the review process, discrepancies were adjudicated by an independent third party.

**RESULTS:** A total of 409 unique results were retrieved, and five studies were included. None of the included studies were of high methodological quality. Included studies assessed mTBI educational toolkits (n=3), conference presentations and academic journal articles (n=1), and pediatric fellowship training (n=1). Training primarily occurred after residency (i.e., continuing professional development) and focused on awareness and management of mTBI. Three studies measured ED physicians self-reported knowledge uptake and retention, and all three studies reported positive changes in knowledge uptake including self-reported increases in appropriate return-to-school and return-to-play recommendations. An increase in appropriate return-to-school/sports recommendations was reported in one study, measured by surveying parents of children diagnosed with mTBI.

**CONCLUSIONS:** After a systematic and comprehensive search, few studies on mTBI education or training targeting ED physicians were identified and focused on process change rather than outcomes, highlighting an evidence-practice gap that needs to be addressed to improve mTBI patient care. Existing mTBI knowledge translation, including EDP education, needs to be optimized to effectively disseminate evidence-based best-practices for mTBI management in the ED.

## **RESOURCE ALLOCATION, VALUES AND EQUITY: MAINTAINING EQUITY IN THE FACE OF ANONYMITY.**

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**INTRODUCTION:** Health care budgets are constrained. Funding new health technologies imposes an opportunity cost, since resources cannot then be used for other activities within the health care system. This opportunity cost may be considered in terms of health losses for other patients. A comparison of the expected health gains for the beneficiaries of a new health technology to the expected health losses for other patients is an important consideration when assessing new health technologies for potential reimbursement within public health care systems.

**METHODS:** We consider how cost-effectiveness analysis can be used to make comparisons between health gains and health losses when assessing new health technologies. The social value positions implied by the use of cost-effectiveness analysis are considered, including the implied horizontal and vertical equity positions. The implications of modifying these equity positions – for example by applying additional weights to the health of individuals with a more severe disease – will then be considered.

**RESULTS:** Cost-effectiveness analysis allows for a direct comparison of the health gains and losses associated with adopting a new technology only in cases where the cost-effectiveness threshold reflects a supply-side estimate of the shadow price of the health system budget constraint. Where a vertical equity position is adopted in which all equivalent health gains and losses are assigned equal value, cost-effectiveness analysis is consistent with the principle of horizontal equity: that is, equal value is assigned to health gains or losses for individuals with similar characteristics of ethical/legal relevance. Where an alternative vertical equity position is preferred – for example, where greater value is placed on health gains for individuals with a more severe disease – maintaining horizontal equity requires that a similarly greater value is placed on health losses for individuals with an equivalently severe disease who bear the opportunity cost of funding the new technology. This, in turn, requires estimates of the severity of disease among patients who bear the opportunity cost.

**CONCLUSIONS:** The social value positions implied by the use of cost-effectiveness analysis depend upon the specification of the cost-effectiveness threshold. The ‘anonymity’ of patients who bear the opportunity cost of funding new health technologies presents substantial practical difficulties for the adoption of alternative vertical equity positions within the assessment of new health technologies.



## **TRANSFORMING THE COST-EFFECTIVENESS THRESHOLD INTO A 'VALUE THRESHOLD': INITIAL FINDINGS FROM A SIMULATION MODEL.**

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**INTRODUCTION:** The conventional model of the cost-effectiveness (CE) threshold adopts numerous assumptions, including constant returns and divisibility of technologies. The consequences of imperfect information are not considered, nor the possibility that interventions may represent disinvestments (releasing resources rather than displacing existing services). Furthermore, no consideration is made for aspects of 'value' not captured by the quality-adjusted life year (QALY). Our objective is to transform the CE threshold into a 'value threshold' that is of greater use to decision makers, while addressing the limitations described above.

**METHODS:** As a first step we developed a simulation model of a hypothetical health system in order to understand how a 'value threshold' may differ from a conventional CE threshold. Of interest are the implications of: (a) relaxing assumptions such as constant returns and divisibility of technologies; (b) incorporating imperfect information and 'value' considerations within a complex health system with multiple decision makers; and (c) extending the threshold so it may be used to appraise disinvestments.

**RESULTS:** Under conventional assumptions, the CE threshold has 'kinks' where displacement switches between services. Under diminishing returns these 'kinks' smooth out. When technologies are indivisible, the threshold instead follows a step function. Imperfect information and 'value' considerations beyond the QALY may justify different thresholds for investment and disinvestment decisions.

**CONCLUSIONS:** This work represents a first attempt at constructing a more sophisticated theoretical model of value-based decision making within complex health systems. Our findings provide insights for future theoretical work and a rich source of hypotheses for empirical research.





**Emergency Medicine Research Day  
Visiting Speaker Lecture**



**Lisa Calder, MD MSc FRCPC**

Director of Medical Care Analytics, Canadian Medical Protective Association  
Associate Professor at the Department of Emergency Medicine, University of Ottawa  
Scientist of the Clinical Epidemiology Program, Ottawa Hospital Research Institute

***“Implementing patient safety initiatives in the ED:  
addressing safety gaps using a research approach”***

**Tuesday, June 13, 2017 10:55am – 12:00pm  
Allard Family Conference Room  
1-080 Katz Building**