

# Research Day 2013

Dr Brian Rowe's talk on  
['Getting Your Research Project Across the Finish Line'](#)

## **Evidence-based Diagnostics: Adult Small Bowel Obstruction**

### **\*1st Place**

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**Background:** Small bowel obstruction (SBO) is a clinical condition that is often initially diagnosed and managed in the emergency department (ED). The high rates of potential complications that are associated with a SBO make it essential for the emergency physician to make a timely and accurate diagnosis.

**Objective:** The primary objective was to perform a systematic review and meta-analysis of the history, physical examination, and imaging modalities that are associated with the diagnosis of SBO. The secondary objectives were to identify the prevalence of SBO in prospective ED-based studies of adult abdominal pain and to apply Pauker and Kassirer's threshold approach to clinical decision-making to the diagnosis and management of SBO.

**Methods:** MEDLINE, EMBASE, major emergency medicine textbooks, and the bibliographies of selected articles were scanned for studies that assessed one or more components of the history, physical examination, or diagnostic imaging modalities used for the diagnosis of SBO. Those articles that were selected underwent a quality assessment by two of the authors using the Quality Assessment Tool for Diagnostic Accuracy Studies 2 (QUADAS-2). Data used to compile sensitivities and specificities was obtained from these studies and a meta-analysis was performed on those that examined the same historical component, physical exam technique, or diagnostic test. Separate information on the prevalence and management of SBO were used in conjunction with the meta-analysis findings of CT to determine the test and treatment threshold.

**Results:** The prevalence of SBO in the ED was determined to be approximately 2% of all patients who present with abdominal pain. Having a previous history of abdominal surgery, constipation, and/or abdominal distention on exam were the best history and physical examination predictors of SBO. X-ray was determined to be the least useful imaging modality for the diagnosis of SBO with a pooled +LR 1.64 (95%CI 1.07-2.52). On the other hand CT and MRI were both quite accurate in diagnosing SBO with +LRs of 3.6 (5-10mm slices, 95% CI 2.3-5.4) and 6.77 (95% CI 2.13-21.55) respectively. Although limited to only a select number of studies, the use of ultrasound was determined to be superior to all other imaging modalities with a +LR 14.1 (95%CI 3.57-55.66) and a -LR of 0.13 (95% CI 0.08-0.20) for formal scans and a +LR 9.55(95%CI 2.16-42.21) and a -LR 0.04 (95%CI 0.01-0.13) for bedside scans. Using the CT results of the meta-analysis for the 5-10mm slice subgroup as well as information on IV contrast reactions and nasogastric (NG) intubation management, the pre-test probability threshold for further testing was determined to be 1.5% and the pre-test probability threshold for beginning treatment was determined to be 20.7%.

**Conclusions:** The potentially useful aspects of the history and physical examination were limited to history of abdominal surgery, constipation, abnormal bowel sounds, and abdominal distention. CT, MRI, and ultrasound are all adequate imaging modalities to make the diagnosis of SBO. Bedside ultrasound, which can be performed by emergency physicians, had very good diagnostic accuracy and has the potential to play a larger role in the ED diagnosis of SBO. More emergency medicine focused research into this area will be necessary to bring about this change.

**Administration and Leadership Competencies: Establishment of a National Consensus for Emergency  
Medicine  
\*2nd Place**

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**Introduction:** The Royal College of Physicians and Surgeons of Canada require emergency medicine (EM) residency programs to meet training objectives relating to administration and leadership. The purpose of this study is to establish a national consensus on the competencies for inclusion in an EM administration and leadership curriculum.

**Methods:** A modified Delphi process involving two iterative rounds of an electronic survey was used to achieve consensus on competencies for inclusion in an EM administration and leadership curriculum. An initial list of competencies was compiled by the authors using a search of the peer-reviewed and grey literature. The participants included 14 EM residency program directors and 43 leadership and administration experts from across Canada who were recruited using a snowball technique. The proposed competencies were organized using the CanMEDS Physician Competency Framework and presented in English or French. Consensus was defined *a priori* as >70% agreement.

**Results:** 13/14 institutions with an FRCPC EM program had at least one participant complete both surveys. 35 of 57 (61.4%) participants completed round 1 and 30 of 35 (85.7%) participants completed round 2. Participants suggested an additional 16 competencies in round 1. The results of round 1 informed the decisions in round 2. 59 of 109 (54.1%) competencies achieved consensus for inclusion.

**Conclusions:** Based on a national modified-Delphi process, we describe 59 competencies for inclusion in an EM administration and leadership curriculum that are arranged by CanMEDS Role. EM educators may consider these competencies when designing local curriculum objectives.

## Retrospective Evaluation of Trauma Team Activations and Outcomes at a Canadian Trauma Centre \*3rd Place

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Affiliation: College of Medicine, Department of Family Medicine, University of Saskatchewan

**Introduction:** Trauma is the leading cause of death in patients under age 40, and is associated with significant morbidity and mortality. In addition, trauma scoring systems and treatment of patients in designated trauma centres has been shown to improve mortality. Regular evaluation and assessment of a trauma system allows for identification of its strengths, as well as areas needing improvement. Conditions for activation of a trauma team should be highly sensitive to capture all serious traumas, but remain sufficiently specific to avoid overuse of resources. The anticipated benefit is the evaluation of the current trauma system in Saskatoon, including assessment of current triage protocols for level 1 and 2 trauma team activations, injury severity and resource use.

**Methods:** After Research Ethics Board (REB) approval, a retrospective chart review was performed on trauma activations from April 1, 2011 to March 30, 2012. Data was collected for all level I trauma team activations (TTAs) presenting initially to a Saskatoon Health Region (SHR) hospital. These were compared with age-matched level II controls. Data collected included injury severity score (ISS), need for operative intervention, intensive care unit (ICU) admission and survival. Validated pre-hospital scoring systems including the MGAP (Mechanism, Glasgow Coma Scale, Age, Systolic blood pressure), Revised trauma score (RTS) and Triage-RTS (T-RTS) were also calculated. Receiver operator characteristic curves were created for applicable variables and sensitivity and specificity were calculated.

**Results:** 94 level I and 101 level II trauma charts were reviewed. Mean age was  $30.9 \pm 13.9$  (std. deviation) with 63/195 (32%) having penetrating trauma. Mean ISS was  $7.32 \pm 12.7$ . When classifying severely injured patients (ISS > 15) the level I and II activation criteria had a sensitivity of 20.4% (95% CI, 12.7-30%) and specificity of 95% (95% CI, 88.8-98.4%). This was out performed by a dichotomous T-RTS score (at less than 12 and equal to 12) which had sensitivity of 41.3% (CI 27-57%) and specificity 96.6% (CI, 92.2-98.8%).

**Conclusion:** Level 1 and Level 2 trauma criteria appear highly specific in our population but may be outperformed in sensitivity by physiological scoring such as T-RTS. Limitations of this study may include skewed data as the established scores of MGAP, RTS and T-RTS did not perform as accurately as large population studies

## Estimating Pediatric Weights in the Emergency Department: When we guess wrong, what are the implications?

\*Honourable Mention

Ferguson J, Sadoway R, Finningley A, Woods RA

Affiliation: College of Medicine, University of Saskatchewan, Saskatoon SK

**Introduction:** In Emergency Departments (EDs), medications for pediatric patients are dosed based on weight. In resuscitation, clinicians often use an age-based or length-based method to estimate the child's weight quickly. Our team set out to discover how accurate some of the weight estimation methods are in our local pediatric population.

**Methods:** We prospectively enrolled a convenience sample of 501 patients presenting to the Pediatric ED at Royal University Hospital between June 1 and August 1, 2012. The patients were weighed and measured by one of two medical student researchers and their demographic data was recorded. The patients' weights were estimated using one of seven age-based methods and compared to the actual weights. From this, a percent error was calculated for each method. A Broselow color category was assigned based on the patients' length and compared to the color category based on actual weight. The numbers of discordant and concordant categories were tabulated.

**Results:** There were 226 females and 275 males, age range from 2 days to 17 years with a median age of 3.36 yrs. Percentage error for each method were as follows: *Advanced Pediatric Life Support* = +12.01%; *Luscombe* = -1.06%; *Argall* = +5.11%; *Anesthesia Formula* = +5.83%; *Leffler* < 1 yr = +0.58%, > 1 yr = -0.35%; *Best Guess* < 1 yr = -8.49%, 1–5 yrs = -4.62%, 5–14 yrs = -4.33%; *Nelson's* 3-12 mo = 0.42%, 1–6 yrs = 10.18%, 7–12 yrs = 14.23%. The Broselow Tape was concordant in 66.47% of patients with the 2007 edition and 66.67% with the 2011 edition. There was no significant difference found for sex or race except for the Asian group with the 2007 edition where 31% of patients were overestimated by one category ( $p=0.01$ ).

**Conclusion:** Most methods of pediatric weight estimation are fairly accurate in the majority of situations. The Broselow Tape will estimate the correct weight category two thirds of the time. This is consistent with other published data. Further study is needed to determine the implications for the patient when wrongly dosed medication or wrongly sized equipment is used in the initial resuscitation.

**Fostering Leadership in Emergency Medicine: Inclusion of an Administrative Rotation within the Family Medicine Emergency Medicine Residency Program at the University of Saskatchewan**  
**\*Honourable Mention**

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**Introduction:** The University of Saskatchewan Family Medicine Emergency Medicine (FM EM) residency program has developed and implemented a unique 4 week administrative rotation run through two satellite teaching sites in the Regina Qu'Appelle Health Region. Faculty identified common administrative challenges facing Emergency Department physicians and hoped to enhance EM education by providing additional learning opportunities on department management and flow, teaching of medical learners, business, EMS/Police collaboration and medico-legal issues.

**Methods:** Our multi-case qualitative study gathered feedback to better understanding the perceived value the rotation serves as a component of the FM EM training program at the University of Saskatchewan. Data was collected through descriptive interviews with 12 of 17 past residents who have completed the rotation. Interviews were digitally recorded and then transcribed for content analysis. The analysis of the written data was conducted manually using a process of coding and identifying themes.

**Results:** All past residents participating in our study deemed the administrative rotation valuable to their EM education. Eight themes were identified and included (1) Value-added curriculum, (2) Professional reflections, (3) It's all about the flow, (4) Taking stalk- developing a critical regard in approach to management of an emergency department, (5) Medico-legally robust practice, (6) Fostering clinical teaching, (7) Out in the open- discussions around physician business and lifestyle, and (8) Timing is everything. The rotation components that most impacted current practice as they transitioned into staff physicians were shifts and sessions that offered strategies to manage department flow and teaching medical learners. The discussions on physician finance and medico-legal challenges were also considered to be very important.

**Conclusions:** Those who have completed the administrative rotation as part of the FM EM residency year consider it to be a valuable learning experience that has positively impacted their current practice. As guided by the feedback of past residents, we feel it is important to continue to offer this administrative rotation as a component of the FM EM residency curriculum at the University of Saskatchewan.

## **Knowledge Translation of Guidelines for the Emergency Department Management of Recent onset Atrial Fibrillation and Flutter: A retrospective chart review**

Finningley A, Sadoway R, Woods RA

Affiliation: College of Medicine, University of Saskatchewan

**Introduction:** Recent onset atrial fibrillation and flutter (RAFF) is a common cardiac rhythm disorder managed by emergency physicians. Guidelines for the optimal emergency department (ED) management of symptomatic RAFF were released in 2010.

**Methods:** A retrospective chart review was conducted to determine if management at a tertiary care ED in Saskatoon, SK was influenced by the guidelines. A total of 1076 charts were reviewed. Charts with symptomatic RAFF with a known onset of 48 hours and less were included for analysis. Two time frames were compared, prior to the release of RAFF guidelines (April 1, 2009 to March 31, 2010, n= 196) and after educational dissemination of the guidelines (September 1, 2011 to May 31, 2012, n=137).

**Results:** There were similar baseline characteristics between the two groups, with the exception of significant increases in median duration of palpitations and prevalence of several concurrent medical conditions in the post guideline group. There were no statistical differences between the two groups for rates of hospital admission (27.5% vs. 32.1%,  $p=0.36$ ) and the use of electrical cardioversion (24.6% vs. 26.3%,  $p=0.73$ ). Significant decreases were found in the post guideline group for median ED Length of Stay (LOS) (6.05 vs. 5.27 hours,  $p=0.03$ ) and consultation with cardiology (55.7% vs. 43.1%,  $p=0.02$ ). Significant increases were observed regarding the use of rate control medications (54.6% vs. 67.2%,  $p=0.02$ ) and Procainamide (2.6% vs. 15.3%,  $p<0.0001$ ).

**Conclusions:** Significant decreases in ED cardiology consults, ED LOS and an increase in treatment with IV procainamide are changes in the post-guideline phase that are consistent with the RAFF guidelines. However, a 32.1% hospital admission rate for RAFF and a significant increase in management with rate controlling medication suggest that the guidelines are not being consistently applied in this ED.

## Comparison of Traditional Triage Scores and CTAS methods with a Quick Look Triage Approach

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**Introduction:** In an attempt to address long wait times for patients seeking medical attention in emergency department, we investigated the possibility of introducing a rapid triage process based solely on chief complaint and the nurse's first impression of the patient. If implemented it would minimize time spent at the triage desk and reduce patient line-ups.

**Methods:** The student investigator was near the triage nurse as patients were being assessed. The nurse would give a rapid score to the investigator based on meeting the patient and hearing their chief complaint. Afterwards, a comprehensive CTAS score was achieved and assigned to the patient. The analysis was comparing the accuracy of the rapid score matching the CTAS score.

**Results:** In total, 496 patients were observed. Weighted Kappa values, a statistical measure for agreement, could be individually calculated for 24 of the nurses. 83.3% of them achieved Good or Very Good measures of Kappa agreement. This indicates that the rapid score they gave after the chief complaint closely matched the CTAS score arrived at after a longer and more comprehensive process. Of the 496 pairs of observations, 419 (84.5%) agreed. Concerning mismatches occurred in 13 patients (2.6%). Of these 13, two patients rated rapidly as 4 initially were subsequently given a CTAS level 2, while 11 were assessed as 3 on rapid scoring and then also upgraded to 2.

**Conclusion:** Experienced triage nurses have the ability to safely and efficiently sort patients based on a rapid assessment comprised of a quick observation of the patient and chief complaint. Implementation of rapid assessment at triage can shorten waiting times, providing faster access to treatment and possibly improve patient outcomes



## **Assessment of Regina Qu'Appelle Health Region (RQHR) Emergency Physician Management of Recent Onset Atrial Fibrillation and Flutter**

Ward J MD, Tedford D, Karreman E, Hanson J

Affiliations: College of Medicine, University of Saskatchewan, Research and Health Information Services, Regina Qu'Appelle Health Region

**Introduction:** Atrial fibrillation is a common presentation to the Emergency Department (ED). The 2010 Canadian Cardiovascular Society (CCS) guidelines on atrial fibrillation/flutter aimed to optimize ED management, reduce length of stay, and hospital admissions. For quality improvement, we compared RQHR ER physician management patterns with the current CCS Guidelines.

**Methods:** We retrospectively reviewed 357 charts of patients presenting to Regina General Hospital with acute-onset atrial fibrillation/flutter between January 1, 2011 and December 31, 2011. We excluded charts if patients were not seen by ER physicians, had symptoms longer than 48 hours, had mechanical valves, or their primary medical problem was not atrial fibrillation/flutter. 97 charts were left after exclusion. Our primary outcome was adherence to guidelines: conversion strategy, thromboembolic prevention, and follow-up. Our secondary outcome compared length of stay (LOS) between rate and rhythm controlled patients.

**Results:** RQHR ER physicians met all three guidelines in 31/97. Thromboembolic management was most commonly mishandled followed by conversion strategy. We compared LOS between rate and rhythm control groups for all 64 patients discharged home. Of these, 27 received rate control; 17 received rhythm control; and 20 received a combination or neither. Although following guidelines was not found to influence LOS, we found that rhythm control ( $5.13 \pm 2.85$ ) did result in a decreased LOS compared to rate control ( $7.70 \pm 3.08$ ) ( $p = .009$ ).

**Conclusion:** RQHR ER physicians followed 2010 CCS Guidelines for acute onset of atrial fibrillation and flutter in 32% of cases. Our results suggest that a rhythm control strategy reduces LOS for patients discharged home directly from the ED.

## **Managing dental pain in the Emergency Department: Can dental blocks reduce opioid prescriptions?**

Baig J

**Background:** Dental pain is a common complaint in emergency departments.

Since definitive treatment usually requires referral to a dentist, emergency physicians are limited in their management options, which include non-opioid analgesics, opioids, antibiotics and dental nerve blocks. Emergency physicians generally have little or no formal training in dental nerve blocks and, as such, may be more inclined to prescribe medications, including opioids. The goals of this study were the following: (1) to examine how dental pain is managed in the Regina General Hospital Emergency Department (RGH ED), (2) to analyse whether dental nerve blocks resulted in fewer opioids being prescribed, and (3) to determine if there is a difference in bounce-back rates between patients who received dental nerve blocks and those who did not.

**Methods:** This retrospective chart review looked at patients who visited RGH ED over a one-year period between July 1, 2011 and June 30, 2012. Medical records were abstracted for patients > 16 years of age with a diagnosis of “dental caries” (ICD K02), “diseases of pulp and periapical tissues” (ICD K04), “gingivitis and periodontal diseases” (ICD K05), and “toothache NOS” (ICD K08.87). Bounce-back patients were defined as those who returned to the emergency department for the same chief complaint within 72 hours of receiving either medication or a dental nerve block.

**Results:** Of the 229 records obtained for emergency department visits that fit the inclusion criteria, 35 patients (15.3%) left without being seen by a physician. Data from the remaining 194 records showed that 50.0% received prescriptions for opioids, 27.8% for anti-inflammatories, and 70.6% for antibiotics. Six dental nerve blocks were performed (3.1%). Although there were 7 bounce-back visits after receiving oral pain medications (3.6%) and 1 after receiving a dental nerve block (0.5%), 7 of these bounce-backs were by the same individual. Due to the limited number of dental nerve blocks done and total patient bounce-backs, a chi-square analysis could not be performed.

**Conclusions:** Dental nerve blocks were rarely used in the RGH ED even though they are an effective means of controlling dental pain. Opioid prescriptions were given to half of all patients who presented with dental pain. Due to few dental nerve blocks done and few patient bounce-backs, this study could not conclude whether dental nerve blocks result in fewer opioids prescribed in the emergency department setting. Based on the literature, this outcome remains a theoretical possibility.

## **Visual acuity testing in the emergency department: Is the best practice common practice?**

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Affiliation: College of Medicine, University of Saskatchewan

**Introduction:** Ophthalmic complaints are a common presentation to the Emergency Department (ED). However, there is a paucity of literature regarding the frequency of visual acuity testing in patients presenting with these complaints, despite current literature recommending visual acuity (VA) testing be completed on such patients. This project aims to compare current practices in a health region to the recommended guidelines and possibly identify an area for improvement.

**Methods:** A randomized, retrospective chart review was performed which examined ED visits for ophthalmic related complaints at three hospitals in Saskatoon, Saskatchewan between July 2011 and July 2012. Of specific interest was if VA was tested, by whom and how accurately it was recorded. Charts were identified according to the relevant billing code and reviewed for a documented VA.

**Results:** A total of 233 charts were reviewed. 219 were included in the analysis (91.4%). Rates of documented VA examination were Royal University Hospital (RUH) 60.8%, St. Paul's Hospital (SPH) 43.1%, and Saskatoon City Hospital (SCH) 87.7%. The actual value was documented in 86.4% of the charts in which visual acuity was checked. Of the 5 diagnostic categories, VA was checked most frequently in patients presenting with altered vision (75%).

**Conclusions:** Our results show that the frequency of visual acuity testing in Saskatoon is less than ideal. This review has identified an area of emergency medicine that requires improvement and can provide a basis by which to improve.

## Door to ECG time in CTAS 2 Chest Pain Presentation in the Saskatoon Health Region Hospitals

Cload B, Van't Spyker A, McKay S

**Introduction:** There are over 6.9 million visits to Canadian Emergency Departments annually. Of patients presenting with Chest Pain, over 13,000 are diagnosed with myocardial infarction. Emergency Departments need efficient processes for early identification of acute coronary syndromes. The American Heart Association (AHA) recommends, "An ECG should be performed and shown to an experienced Emergency Medicine Physician within 10 minutes of ED arrival" to facilitate risk stratification. We undertook a study investigating whether Saskatoon Health Region (SHR) was routinely meeting the AHA recommendation

**Methods:** This retrospective quality assurance study examined Door-to-ECG time for all CTAS 2 Chest Pain presentations to SHR hospitals from January 1, 2012 – March 31, 2012. Time of presentation was captured from the triage note as a surrogate for ED arrival. ECG time was taken from Tracemaster first recorded ECG. If first ECG was recorded prior to triage note, time was set to 00:00:00.

**Results:** n=1066 (990 first visit, 76 transferred to SHR). SHR Mean (hh:mm:ss): 00:24:14, min: 00:00:00, max: 02:48:53. Royal University Hospital (RUH): n=654 (transfers excluded); mean=00:27:30 ±00:01:45 (95% CI); St. Paul's Hospital (SPH): n=226; mean=00:15:49±00:01:53 (95% CI); Saskatoon City Hospital (SCH): n=110; mean=00:21:59±00:03:40 (95% CI).

**Conclusions:** No SHR hospital meets AHA guideline recommendations for initial ECG in CTAS 2 potential cardiac chest pains. SHR Door-to-ECG process needs systemic improvement.

## Emergency Department Analgesia in Acute Appendicitis: A Comparison of Adult and Pediatric Patients

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Affiliation: University of Saskatchewan, Regina, SK.

**Introduction:** The under-treatment of pain, known as “oligoanalgesia”, is a well-recognized phenomenon in the Emergency Department (ED), and it has been suggested that children are especially at risk. However, there is a paucity of good evidence, especially from general (i.e. mixed adult and pediatric) emergency departments. This study was designed to compare the pain medication received by adult and pediatric patients with appendicitis presenting to a general ED.

**Methods:** This observational study was a retrospective chart review of consecutive patients discharged from the Regina General Hospital (RGH) with a discharge diagnosis of “appendicitis”. The ED chart was reviewed and data were extracted regarding type, timing, and amount of pain medication given. Adult and pediatric data were then compared.

**Results:** In total 165 patients (92 adult and 73 pediatric) who presented via the ED were eligible for inclusion. Mean pain scores recorded at presentation were slightly lower for children vs. adults (6.49 vs 7.19 out of 10,  $p=0.015$ ). Pediatric patients were significantly more likely than adult patients not to receive any analgesia during their ED stay (58.9% vs 20.7%,  $p<0.001$ ). They were also significantly less likely to receive opioid analgesics, compared to adults (30.1% vs. 77.2%,  $p<0.001$ ). Pediatric patients were also less likely to receive analgesia within an hour of being seen by the ER physician, though the difference did not reach statistical significance.

**Conclusion:** In this retrospective observational study, pediatric patients with appendicitis presenting to a general emergency department received less opioid pain medication, and less pain medication in general, than their adult counterparts.