AIRWAY MANAGEMENT POSTER DISCUSSION
Sunday, June 26
8:00 AM - 9:45 AM

Moderator: Orlando Hung
Moderator: Adriaan Van Rensburg, University of Toronto, Department of Anesthesia and Pain Management, Toronto, Ontario

148412 - POST-INTUBATION LARYNGOSCOPY NOT A PREDICTIVE TOOL
Primary & Presenting Author: Julena Francesca. Foglia, University of Calgary, Calgary, Alberta
Primary Author: Kaylene Duttchen, University of Calgary, Calgary, Alberta
Co-Authors(s): David Archer, Saul Pytka, Leyla Baghirzada

149529 - HEMODYNAMIC RESPONSES TO INTUBATION BY THE BONFILS COMPARED TO C-MAC
Primary & Presenting Author: Youssef Ezahr, Sherbrooke University, Quebec, Sherbrooke, Quebec
Co-Authors(s): Pablo Echave, Frederick D'Aragon

150997 - PALPATION OF SLIDING CUFF TO ASSESS ENDOTRACHEAL TUBE LOCATION
Primary & Presenting Author: Jimmy T.H. Lam, University of Saskatchewan, Saskatoon, Saskatchewan
Primary Author: William P. McKay, University of Saskatchewan, Saskatoon, Saskatchewan
Co-Authors(s): Andrew Peeling

151155 - PREDICTING AND MANAGING THE MORBID OBESITY DIFFICULT AIRWAY (MODA)
Presenting Author: Adele Budiansky, Department of Anesthesiology, The Ottawa Hospital, University of Ottawa, Ottawa, Ontario
Primary Author: Naveen Eipe, Department of Anesthesiology, The Ottawa Hospital, University of Ottawa, Ottawa, Ontario
152766 - EPISTAXIS RATE- PARKER FLEX-TIPTM VS STANDARD NASAL RAE TUBE
Primary & Presenting Author: Enda M. Shanahan, Vancouver General Hospital, Vancouver, BC, Canada, Vancouver, British Columbia

Co-Authors(s): Rosie Earle, Himat Vaghadia, Raymond Tang, Andrew Sawka, Rosie Earle, Himat Vaghadia, Raymond Tang, Andrew Sawka

152782 - CHOICE OF DIRECT VS VIDEO LARYNGOSCOPY FOR THE EMERGENCY AIRWAY
Primary Author: Casey Petrie, Queen's School of Medicine, Kingston, Ontario
Presenting Author: Kim Turner

Co-Authors(s): Meredith Briggs, Kim Turner, John Murdoch, Heather Murray, Rachel Phelan

152973 - A COMPARISON OF METHODS USED TO SECURE PEDIATRIC ENDOTRACHEAL TUBES
Primary & Presenting Author: Andrew Peeling, University of Saskatchewan, Saskatoon, Saskatchewan

Co-Authors(s): Jonathan Gamble, William McKay, Christopher Durr, Jennifer O'Brien

153213 - EVALUATION OF A LOW COST, 3D-PRINTED MODEL FOR BRONCHOSCOPY TRAINING
Presenting Author: Massimiliano Meineri, UHN - Toronto general Hospital, Toronto, Ontario

Primary Author: Matteo Parotto, University of Toronto/Toronto General Hospital, Toronto, Ontario

Co-Authors(s): Josh Qua Hiansen, Ahmed AboTaiban, Alisher Agzamov, Svetlana Ioukhova, Matteo Parotto, Alisher Agzamov, Josh Qua Hiansen, Svetlana Ioukhova, Ahmed AboTaiban
INTRODUCTION
When the success of direct laryngoscopy is in question, a convenient and simple test would be to perform direct laryngoscopy after the patient had been successfully intubated by an alternative method [1]. If the glottis opening can be reliably visualized by this strategy, then documentation of the view as the Cormack-Lehane score could be used as a clinical predictor of future laryngoscopies [2]. This may be important for effective planning and preparation of airway interventions, such as emergency intubation or placement of advanced airway devices [3]. Key to the safety of using a post hoc Cormack-Lehane score as a clinical predictor is that the presence of an endotracheal tube does not significantly alter the laryngoscopic view. Therefore, we conducted a prospective observational study to compare modified Cormack-Lehane (MCL) scores determined during direct laryngoscopy before and after tracheal intubation.

METHODS
After obtaining approval for the protocol from the Conjoint Health Research Ethics Board, human patients were recruited. Informed consent obtained from 173 adults between 18-86 undergoing elective procedures that require general anesthesia and endotracheal intubation. After induction of general anesthesia, direct laryngoscopy was performed and the best view attainable without external manipulation was documented according to the MCL grade. If this view was worse than 1, then bimanual manipulation was applied to attempt to improve the view, and the best possible view with bimanual manipulation was also recorded. After intubation and before resolution of paralysis the same physician as previously described performed a second direct laryngoscopy.
RESULTS
The main finding of this study was that the endotracheal tube altered the MCL in 58/173 patients (33%), 'worsening' the grade in 30 patients (17.34%) and 'improving' the grade in 28 patients (16.18%) (Table 1). When BURP was applied, the view remained altered in a minority of patients (23/173; 14%); in 10 patients (6%) the MCL grade 'improved' while in 13 patients (8%) the grade 'worsened' (Table 2).

DISCUSSION
It has been suggested that easy emergency re-intubation can be assumed, following awake fiberoptic intubation if direct laryngoscopy in the intubated patient demonstrated a good view of the glottis [3]. However, our results demonstrate that an endotracheal tube does alter the best obtainable view of the glottis in an unpredictable fashion. The presence of the endotracheal tube both increased visualization of the glottis and worsened the view in different subjects. The important outcome was that the presence of the endotracheal tube did, in fact, change the view obtained of the larynx during direct laryngoscopy. In conclusion post-intubation, MCL grades may not be reliable to predict laryngeal grade and should be used with caution in the right clinical context.

References:

INTRODUCTION
Direct laryngoscopy (DL) produce tachycardia and increased blood pressure that could be fatal in patient with brain injury\(^1,2,3\). Bonfils fiberscope and videolaryngoscope C-MAC are associated with little hemodynamic instability compared to DL\(^1,4\). Scientific evidence comparing these two alternatives do not exist. In order to determine the comparative hemodynamic effect of Bonfils to C-MAC we conducted a randomized controlled trial in patients undergoing elective surgery.

METHODS
After Internal Review Board approval, 50 patients between 18-60 years old, ASA 1-2 and listed for elective surgery were randomly assigned to intubation with Bonfils or C-MAC in a 1:1 ratio. Exclusion criteria were: patient refusal, expected difficult intubation criteria (Cormack - Lehane Grade ≥ 2, Mallampati > 2 , Patil < 4 cm, mouth opening < 3 cm), active smoking and chronic hypertension. After a standardized induction, intubation was made via the retromolar approach (Bonfils group) or via videolaryngoscopy (C-MAC group). Operators had performed a minimum of 30 intubations with Bonfils and 20 intubations with C-MAC to be eligible to participate. A research assistant blinded to the intervention recorded heart rate (HR) and arterial blood pressure (systolic BP, diastolic BP, mean arterial blood pressure [MAP]) at induction and at every minute during the five minutes post intubation. As a secondary outcome, difference in time of intubation between the two instruments were recorded. The sample size was determined for a power of 80\%, a significance level of 0.05 and an increase in MAP of 20 mm Hg. A p value ≤ 0.05 was considered statistically significant. Analysis of the results was conducted in patients who had the procedure ("per protocol analysis").
RESULTS (cf figure 1a,b)
Fifty patients were enrolled and 47 were analyzed. Two patients in the Bonfils group and one patient in the C-MAC group were excluded for breach of protocol. After randomization, the two groups were comparable except for ASA I/II ratio which was slightly higher in the C-MAC group (p=0.046). HR (p = 0.40) and MAP (p = 0.30) were comparable between the two groups within five minutes post-intubation. Intubation time was shorter with C-MAC than with Bonfils (30 ± 2 seconds vs 38 ± 2 seconds; p = 0.02).

CONCLUSION
Our study demonstrated that the hemodynamic responses to tracheal intubation using the Bonfils fiberscope is comparable to the C-MAC videolaryngoscope among ASA 1 and 2 patients scheduled for an elective surgery. In light of these findings, using either technics appears reasonable course of action.

References:

INTRODUCTION
Proper endotracheal tube (ETT) placement is paramount to care during general anesthesia, resuscitation, and intensive care services. Improper placement can lead to hypoxemia and death if left uncorrected. Proper ETT position entails placing the distal tip of the tube mid trachea while the head is in neutral position. We proposed that a specific palpation maneuver - an inflated ETT cuff moving caudally then rostrally following intubation - would enable detection of correct placement of the tip of the ETT within the trachea. This experiment was a proof-of-concept study of the efficacy of the above described palpation maneuver to detect proper ETT placement in comparison to current standards of measurement alignment with upper incisors.

MATERIALS/METHODS
Institutional Research Ethics Board approval, Health Region approval and informed consent from 31 patients were obtained. Patients who were ASA class I or II, physiologically stable, not involved with rapid sequence induction, not in respiratory distress and were safe in the attending anesthesiologist’s opinion were recruited. Attending anesthesiologists, who had choice of anesthetic and intubation equipment, were instructed to intubate the trachea to the depth of their choice. They inflated the cuff on the ETT to a standard pressure of 25 cm H2O and were directed to palpate the trachea while the tube was advanced another 2 cm. If the cuff was not felt, the anesthesiologist slowly withdrew the ETT until the cuff was palpated midway between the crico-thyroid membrane and sternal notch. Bronchoscopy was used to measure intubation depth. Correct ETT tube placement within the trachea was considered to be more than 2.5 cm above the carina and more than 3 cm below the vocal cords. Furthermore, palpability of ETT cuff was rated between the categories: "not felt," "weakly felt" and "strongly felt."

RESULTS
We recruited 12 men and 19 women with a mean age of 56.1 years (SD 15.05, range
The ETT cuff was strongly felt by investigators 97% of the time, affirming the ability to palpate the cuff within the crico-thyroid membrane to sternal notch area. No significant differences, using our criteria of correct placement, were found between our palpation method (right:wrong 30:1) and the current measurement methods (right:wrong 26:4; P = 0.19). No significant saves from endobronchial placements were observed.

DISCUSSION
Our study demonstrates the ability of the proposed palpation maneuver to match the accuracy of current ETT depth accuracy methods. Although there were no significant saves from endobronchial placements, the ease of palpability and demonstrated efficacy make this a valuable tool for tube placement verification and education of tracheal surface anatomy.

References:
No references cited.
Fiberoptic intubation (FOI) is now performed very infrequently in morbidly obese (MO) patients undergoing elective surgery. Prior to the introduction of videolaryngoscopy, the need for FOI had been estimated at 5-10% [1]. Since then others have estimated the need for FOI to be in the 1-5% [2]. The objectives of this study were to review the literature for predictors of difficult airway (DA) in MO, report its described management and comment on the pharmacology of MODA.

Using specific keywords for predictors, management and pharmacology of Difficult Airway (DA) in Morbid Obesity (MO), we performed a search of peer reviewed literature. Using expert opinion and the Delphi technique, we sought to develop consensus for a DA prediction rule specific to MO. We then revised and redeveloped an existing DA algorithm for anticipated difficult airway and customized it with modalities specific to MO.

We identified multiple predictors of MODA in our search of the literature. Based on our findings and expert opinion, we propose a simple algorithm that incorporates the predictors and management of the MODA in Figure 1.

In the general population, MO was/is frequently identified as a predictor of anticipated DA [1]. Now extensive experience suggests that in MO other predictors are required to identify patients requiring advanced airway management strategies [3]. Conventional DA algorithms suggest that supraglottic devices and surgical airways are both effective ‘rescue’ techniques in certain situations where an unanticipated DA is encountered [4]. Experience in MO suggests that alternative management strategies are required in MODA [5]. Also important is the choice, dose and technique of drugs administered during DA management [6]. The avoidance of succinylcholine and judicious use of propofol, remifentanil and/or dexmedetomidine can improve the safety, success and outcomes in MODA. While further research and expert opinion are required to standardize the MODA, this preliminary work may be an important first step in this direction.
References:

2. Minerva Anestesiol 201177: 1011-7
5. Anaesthesia 2014 69: 515-6
INTRODUCTION
Endonasal intubation is a widely performed technique that allows administration of anesthetic during oral, dental and maxillofacial surgeries. Nasal intubation poses several risks not encountered in oropharyngeal intubation, most commonly epistaxis due to nasal abrasion, which can range from mild to massive epistaxis\(^1\) (Hall). A recent study by Sugiyama et al. (2014) \(^2\) found that an oral Parker Flex-Tip\textsuperscript{TM} endotracheal tube (ETT) with a posterior facing bevel, advanced with the aid of an anteriorly flexed stylette, reduced the incidence of epistaxis to 4% compared to 50%, found with a standard ETT\(^2\). Our primary aim was to test the hypothesis that the use of the Parker Flex-Tip\textsuperscript{TM} nasal RAE tube with the posterior facing bevel reduces epistaxis compared to the standard nasal RAE ETT.

METHODS
With local ethics board approval and written informed consent, 60 ASA I and II patients undergoing oral or maxillofacial surgery where a nasal intubation would be appropriate for surgical anesthesia were recruited. Patients were randomized to either a standard nasal RAE ETT or nasal Parker Flex-Tip\textsuperscript{TM} ETT by opening a sealed envelope at induction. Both study groups had the ETT thermosoftened and lubricated prior to insertion, and size of the tube was chosen by the attending anesthesiologist based on clinical judgement prior to unblinding. Intubation was performed by the attending anaesthetist slated for that operating room. After intubation was completed an investigator blinded to tube type scored the presence of epistaxis as none, mild, moderate or severe as per definition by Sugiyama et al. (2014)
RESULTS
No epistaxis was recorded in 30% of the standard tubes vs only 26.6% for the Parker Flex-Tip™. While for moderate epistaxis Parker Flex-Tip™ 36.6% vs 30.0% for the standard tube. There were no incidences of massive epistaxis. None of these differences had statistical significance, (P < 0.5). Secondary results - ease of insertion and post-op pain (VAS) found no difference between groups.

DISCUSSION
We found no statistical significant difference in epistaxis during nasal intubation comparing the nasal Parker Flex-Tip™ tracheal tube with a standard nasal RAE ETT. The Flex-Tip tracheal tube thus does not appear to reduce the incidence of nasal mucosal trauma during nasotracheal intubation in this population compared with the conventional tip tracheal tube. Heterogeneity of study population and individual operator technique may have a greater role in the occurrence of epistaxis post nasal intubation than the design of the tube studied.

References:

152782 - CHOICE OF DIRECT VS VIDEO LARYNGOSCOPY FOR THE EMERGENCY AIRWAY

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INTRODUCTION
Emergency department (ED) and intensive care unit (ICU) teams are responsible for the care of a population which is especially vulnerable to conditions requiring immediate and decisive airway control. Our study aimed to determine if physicians performing emergency intubations will choose direct laryngoscopy or Glidescope videolaryngoscopy more frequently, and which intubator or intubation factors influenced the decision to choose direct versus video laryngoscopy.

METHODS
Local ethics committee approval was obtained. Emergency intubations occurring in hospital were recorded via an operator-completed survey following emergency intubations over a pre-determined period of time. Collected data included indication for intubation, predicted difficulty of intubation, actual difficulty of intubation, reason for predicted or actual difficulty, location of intubation (ED/Ward/ICU), level of operator training, operator specialty, choice of intubation device, reason for choice, number of attempts, and whether or not a different device was required.
RESULTS
51 cases were captured, 32 in the ICU, 16 in the ED, and 3 on regular wards. 1 ED case progressed to the operating room for fiber-optic intubation. The average age of our patients was 66, the youngest was 30 and the oldest was 94. 22 patients were female, 29 were male. 17 patients were characterized as obese. 4 had suspected cervical spine injuries. Direct laryngoscopy was the first choice of technique 32 times (63%), and Glidescope videolaryngoscopy was chosen first 16 times (31%). A Glidescope was used to “rescue” failed direct laryngoscope intubations 8 times, and a direct laryngoscope was used to rescue failed Glidescope intubations twice. All intubations were ultimately successful. Combining all attempts, direct laryngoscopy was successful in 71% of cases and Glidescope videolaryngoscopy was successful in 92% of cases. Intubators were more likely to choose the Glidescope for intubations which they predicted to be difficult. Both modalities were chosen across all levels of training and every specialty, with the exception that all emergency physicians chose direct laryngoscopy first. Intubations which were not predicted to be difficult were noted to be difficult on 4 occasions. Difficult intubation was correctly predicted in 80% of cases. (Figure 1)

DISCUSSION
Physicians working in high acuity care environments use both direct laryngoscopy and Glidescope video laryngoscopy to intubate. The Glidescope video laryngoscope was chosen more frequently than direct laryngoscopy when intubation was predicted to be difficult, and despite this was successful in a greater number of cases (92% vs 71%) in our study. Level of training did not influence the intubation modality chosen. Both devices had notable failure rates, and as it is not always possible to determine which intubations will be difficult, emphasized the importance of ubiquitous training in both techniques and access to both devices for all staff performing emergency intubations.

References:
Nil
A COMPARISON OF METHODS USED TO SECURE PEDIATRIC ENDOTRACHEAL TUBES

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INTRODUCTION
Endotracheal intubation is a common and life saving procedure performed in operating rooms, intensive care units, and emergency departments. An in situ endotracheal tube (ETT) must be secured in position to avoid movement thereby preventing accidental extubation or mainstem intubation, both of which are potentially life threatening(1). It is common to use tapes and topical adhesives for ETT stabilization. Although such methods are commonly employed, limited published research is available to guide best practice.

METHODS
Local research ethics board approval and participant consent was obtained. A prospective interventional study was conducted using a convenience sample of 150 volunteers. The radial aspect of volunteers’ left index finger over the metacarpal phalangeal joint was used as a live dermal model of a human upper lip. Volunteers placed their left arm and hand into a custom experimental apparatus. Experimental tape and adhesive combinations were applied to the volunteer and a pediatric ETT. The study tapes included (all 3M™ products): Elastoplast™, Transpore Clear™, Transpore Cloth™, Medipore™, Micropore™, Cloth Adhesive™. The supplementary adhesives include: none, 3M Cavilon™, tincture of benzoin, and mastisol. An incremental force was vertically applied to the secured ETT until a reference point on the ETT was displaced 3 cm. The force was measured using a force transducer connected to a personal computer. The data was reviewed to determine the peak force applied during each ETT displacement. Three blocks of 50 volunteers were studied. Each block employed unique tape/adhesive combinations. The combined block data were used to compare the 23 total ETT securing methods. A repeated measures ANOVA was used to analyze the data.
RESULTS
Cloth Adhesive Tape with Mastisol required more force to distract the ETT than all other tested methods (p < 0.01). See Figure 1.

DISCUSSION
The results demonstrate of the commonly used methods to secure an ETT the combination of Cloth Adhesive Tape and Mastisol provide the greatest resistance to ETT displacement. This may be the preferred method to secure an ETT when displacement is a major concern.

References:
EVALUATION OF A LOW COST, 3D-PRINTED MODEL FOR BRONCHOSCOPY TRAINING

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BACKGROUND
Flexible bronchoscopy is a common and fundamental procedure in anesthesia and critical care medicine. Learning this procedure is a complex task, which encompasses heterogeneous and multifaceted components. The use of simulation-based training provides significant advantages that include enhanced patient safety, and it has been proven to be superior to non-simulation-based training. Interestingly, even low fidelity simulators proved to be effective, and in certain areas such as basic bronchoscopy tasks they may be superior to high fidelity computerized simulators. Unfortunately, access to a bronchoscopy simulator may be limited in low resources settings. We developed a low cost, highly portable model for bronchoscopy training, using a 3D printout of a normal trachea-bronchial tree from a CT scan image set.

AIM
The aim of this mannequin study was to test the validity of a newly developed bronchoscopy training model.
METHODS
Institutional board review approval was obtained. A parametric airway model was derived from an online medical model repository. The parametric airway was separated into seven distinct regions: trachea, bifurcation, left & right bronchi and primary bronchi to upper left, lower and middle right lobes. Anatomical regions were printed with different colours using a fused deposition modelling 3D printer. Participants were physicians with self-reported no previous experience with bronchoscopy. They received an introductory 30 minutes lecture on flexible bronchoscopy, and were then administered a 15-items questionnaire on bronchoscopy derived from previously published modules of bronchoscopy training. Following this pre-test questionnaire, participants were separately invited to use flexible bronchoscopy on the designated model, and instructed to perform a series of predetermined tasks in 4 consecutive occasions. The time to perform the tasks and the quality of the performance (based on a standardized score assessing ability to identify bronchial anatomy, technique and dexterity, lack of trauma) were recorded. After completion of the mannequin tests, participants were administered again the 15 items questionnaire (post-test). Participants’ satisfaction data on the perceived usefulness and accuracy of the model were collected. Statistical analysis was performed using t-Test. Data are reported as mean (± standard deviation).

RESULTS
The time to complete all the requested tasks was 152.9 (± 71.5) sec on the 1st attempt vs 98.7 (± 40.3) sec on the 4th attempt (p=0.03). The quality of performance score improved from 8.3 (± 6.7) on the 1st attempt to 18.2 (± 2.5) (p

CONCLUSIONS
We developed 3D-printed model for bronchoscopy training. This model improved trainees’ performance, and may represent a valid, low-cost adjunct to the teaching of bronchoscopy.

References:

151073 - LABETALOL AND TIME TO DISCHARGE IN LAPAROSCOPIC CHOLECYSTECTOMIES
Primary & Presenting Author: Sarah K. Maxwell, Queen's University, KINGSTON, Ontario

Co-Authors(s): Judith Marois, Elizabeth VanDenKerkhof, Dale Engen, Rob Tanzola, JUDITH MAROIS, Elizabeth VanDenKerkhof, DALE ENGEN, ROB TANZOLA

151582 - PATIENT SATISFACTION WITH ANAESTHESIA AND PERIOPERATIVE CARE
Presenting Author: Roupen Hatzakorzian, MUHC, St-laurent, Quebec
Primary Author: Annie Cote, McGill University Health Center, Montreal, Quebec

Co-Authors(s): Thomas Schricker, Jordan Gagnon, Valerie Villeneuve, William Li Pi Shan, Roupen Hatzakorzian

152726 - PERIOPERATIVE COMPLICATIONS & STOPBANG SCORES. A METAANALYSIS
Presenting Author: Mahesh Nagappa, LONDON HEALTH SCIENCE CENTRE, ST. JOSEPH'S AND UNIVERSITY HOSPITAL, UNIVERSITY OF WESTERN ONTARIO, Toronto, Ontario

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152970 - LIDOCAINE PRELOADED IN THE ETT CUFF REDUCES EMERGENCE COUGH
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Co-Authors(s): Stephan Williams, Luis Herrera, Monique Ruel, Nathalie Massicotte
INTRODUCTION
Abdominal insufflation during laparoscopic cholecystectomy produces a profound sympathetic response resulting in elevations in heart rate (HR) and mean arterial pressure (MAP). Intraoperative management often includes opioid boluses but this may lead to opiate related side effects. Studies have shown that an opioid sparing technique with the sympatholytic esmolol can effectively control intraoperative hemodynamics and improve postoperative outcomes. We evaluated whether labetalol could effectively maintain intraoperative HR and MAP and whether labetalol would be as effective as esmolol at improving postoperative outcomes compared to fentanyl.

METHODS
Local ethics committee approval was obtained and all patients provided written informed consent prior to study enrollment. One hundred and seven ASA class I-II patients undergoing elective ambulatory laparoscopic cholecystectomy at an academic hospital were randomized to one of 3 double blinded groups for management of increased intraoperative HR or MAP over 20% of baseline: 1) IV fentanyl bolus 50 mcg q5 min., 2) IV labetalol bolus 5 mg q5 min. or 3) IV esmolol bolus 0.25 mg/kg followed by a titrated infusion of 5-15 mcg/kg/min. Time from arrival in post-anesthesia care unit (PACU) to readiness for discharge was recorded as the primary outcome. Secondary outcomes included intraoperative and PACU hemodynamics (HR, MAP), total PACU fentanyl requirements, time to first PACU analgesia, the incidence and management of postoperative nausea and vomiting (PONV) and pain scores. Pain was assessed with the Visual Analogue Pain Score (0=no pain, 10=worst pain) and the incidence and treatment of PONV was assessed at 5, 30 and 60 minutes post-arrival in the PACU. Patient satisfaction scores (1= most satisfied, 5=dissatisfied), prescription analgesia requirements and pain scores were recorded at 24 hours.

RESULTS
The following are preliminary blinded results of the 107 patients enrolled out of the target of 141 (table 1). No treatment was required for intraoperative or PACU hypotension or bradycardia following administration of study drugs. Patient satisfaction at 24 hours was equivalent for each group (1.5/5).

DISCUSSION
The preliminary blinded results demonstrate a safe protocol for the three medication groups. We hope the final results of this study will expand on the potential benefits of beta-blockers for managing intraoperative sympathetic stimulation and specifically identify the utility of labetalol. Labetalol may more effectively control intraoperative hypertension given additional activity at alpha adrenergic receptors, is easier to administer since does not require an infusion, and is less expensive than esmolol.

References:

INTRODUCTION
Over the last decade, patient satisfaction has become an important perioperative outcome. We established a postoperative survey as a quality assurance project to measure patient satisfaction with anaesthesia and perioperative care.

METHODS
The present project was conducted through the quality assurance (QA) department and the research ethics board of McGill University Health Center, at Royal Victoria Hospital, over a period of 2 weeks in 2013. Fourteen questions were constructed to measure patient satisfaction with anaesthesia and perioperative care. Patient anxiety, comfort level and the communication transferred during their care were measured. The response to each item was on a five-point Likert scale ranging from; (4= very acceptable / very much/ always/ very high; 3= reasonably acceptable/ somewhat /usually/ somewhat high; 2= not very acceptable/ not really/ sometimes/ moderate; 1= unacceptable/ not at all/ never/ poor; and not applicable). The questionnaire was filled by the responders prior to their discharge from the PACU. Mean satisfaction percentage score (MSPS) was calculated for each question (0-100%).
RESULTS
Two hundred patients were approached and 165 responded to the survey. Of the patients who completed the survey 62% underwent ophtalmological intervention, 18% gynaecological and 20% other surgery including general surgery and ENT procedures. Eighty percent were outpatient procedures. Forty percent of the patients were in the age group of >66 years old and 51% were female. Overall the patients were satisfied with the perioperative and anaesthetic care they received (Table 1). The encounter with the anaesthesia provider reduced patients’ anxiety level from MSPS of 61.9% at arrival to 89.5%. Patients were very satisfied by the information that the anaesthesia provider communicated with them (MSPS 96.7%). Patients were less satisfied with the information provided to them to navigate the hospital (MSPS 85.81%) and the quietness of the environment in the OR (MSPS 88.3%).

CONCLUSION
Patients' views have become an important element in the evaluation of health care. In our survey we established that patients were satisfied with the perioperative and anesthetic care that they received on the day of surgery. Certain areas can be improved such as providing clearer information on how to navigate the hospital and ensuring a quieter OR environment. By improving these variables patients’ overall anxiety level may be further reduced. More should be done in evaluating patient satisfaction in the perioperative setting in the hopes of improving patient care.

References:
PERIOPERATIVE COMPLICATIONS & STOPBANG SCORES. A METAANALYSIS

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INTRODUCTION
Surgical patients with obstructive sleep apnea (OSA) are associated with increased risk of perioperative complications. The STOP-Bang questionnaire are useful tools to identify the high-risk OSA (STOP-Bang ≥3) patients during the perioperative period. We conducted this meta-analysis to compare the perioperative complications in patients with high STOP-Bang score (≥3) versus low STOP-Bang score (0-2).

METHODS
A search of the literature databases MEDLINE (from 2008 to January 2016), Medline-in-Process & other non-indexed citations (up to January 2016), Embase (from 2008 to January 2016), Cochrane Central Register of Controlled Trials (up to January 2016), Cochrane Databases of Systematic Reviews (from 2008 to January 2016), Google Scholar, Web of Sciences (from 2008 to January 2016), Scopus (2008 to January 2016) and PubMed (from 2008 to January 2016) was carried out. The search yielded 119 citations. Irrelevant papers were excluded by title, abstract and full-text review, leaving 11 manuscripts for analysis. Inclusion criteria were: 1) Studies that used STOP-Bang questionnaire as a screening tool to identify the high-risk and low-risk for OSA in adult surgical population (>18 year); 2) studies that mentioned the perioperative complications associated with high STOP-Bang score (≥3) and low STOP-Bang score (0-2).3) Publications in the English language. The perioperative complications were cardiac events or respiratory events or any complication requiring ICU admission. The study quality was evaluated using the Cochrane risk of bias tool. Statistical analysis was carried out using the Review Manager 5.3 software. The pooled odds ratio for perioperative complications was estimated.

RESULTS
The meta-analysis was carried out in 11 studies including a total of 20,482 patients (High STOP-Bang score group, n=7,598 and low STOP-Bang score group, n=12,884). Overall, the odds of having perioperative complications was higher in high STOP-Bang score patients compared to low STOP-Bang score patients (OR 3.83; 95% CI: 1.75-8.36; P=0.0008)
CONCLUSION
This meta-analysis suggests that patients with high STOP-Bang score (>3) are associated with increased risk of perioperative complications. STOP-Bang questionnaires can identify the high-risk OSA patients and implementing the evidence based perioperative precautions can decrease the risk of postoperative complications. Although patients identified to be at high risk for OSA have been shown to have increased perioperative complications, there was an important caveat to this recommendation. This meta-analysis justifies the implementation of STOP-Bang questionnaires as a screening tool to identify the high-risk OSA patients during the perioperative period.

References:
2. PLOS ONE 2015 Dec 14;10(12):e0143697. doi: 10.1371
152970 - LIDOCAINE PRELOADED IN THE ETT CUFF REDUCES EMERGENCE COUGH

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INTRODUCTION
Alkalinized lidocaine in the endotracheal tube (ETT) cuff decreases the incidence of cough and throat pain on emergence after surgery lasting more than two hours (1)(2). However, as alkalinized lidocaine needs 90-120 minutes to cross the ETT cuff membrane(3)(4), its usefulness in shorter duration surgery is unknown. This prospective double-blind RCT tested the hypothesis that prefilling ETT cuffs with alkalinized lidocaine > 90 minutes before intubation would reduce the incidence of emergence cough after surgeries lasting less than 120 minutes.

METHODS
After local Ethics Board approval, 200 ASA I-III patients consented to be randomized into one of two groups receiving either alkalinized lidocaine (group AL) or saline (group S) to inflate the ETT cuff.

Cuffs were prefilled > 90 minutes before intubation with either 2 ml of 2% lidocaine and 8 ml of 8.4% bicarbonate (group AL) or 10 ml of normal saline (group S). Cuffs were emptied immediately before intubation. After intubation, either 2 ml of 2% lidocaine (AL) or 2 ml of saline (S) were injected into the cuff. Additional 8.4% bicarbonate (AL) or saline (S) was injected into the cuff until there was no air leak. Anesthesia was maintained using desflurane, rocuronium and either fentanyl or sufentanil in order to maintain vital signs within 20% of baseline values. Opioids administered in prophylaxis of extubation cough were proscribed.

A standardized “no touch” emergence technique was used (5). A blinded assessor noted any cough above 0.2 MAC of expired desflurane. At 0.2 MAC, once every 30 seconds, the patient was instructed to open his eyes and extubation occurred once a
directed response was noted.

Sample size calculation was based on a local incidence of emergence cough of 30%. One hundred patients per group were necessary to detect an absolute 15% reduction in cough in the AL group (power: 80%; alpha 5%). Results were assessed using Student’s t test and Fisher’s Exact test as appropriate. Logistic regression with the Lack of Fit P being reported (6) evaluated the relation between cough and continuous variables.

RESULTS
Table 1 shows that the total amount of opioids administered, ETT cuff pre-loading times, duration of surgery and extubation times were not significantly different. The incidence of extubation cough in group AL was 12%, significantly (p=0.04) lower than the 22% incidence in the saline group. Emergence cough was not significantly influenced by smoking (p=0.16) or the use of ACE inhibitors (p= 0.71). Fentanyl dosage was inversely correlated with the incidence of cough (p=0.01), while preloading time (P=0.67) and age (P=0.28) showed no significant correlation.

CONCLUSION
Preloading alkalinized lidocaine in the ETT cuff significantly decreased general anesthesia emergence cough after surgeries with an average duration of less than one hour.

References:


6. Statistical analysis was done using: JMP 11 software (SAS institute Inc. Cary, NC)
150081 - TRANSESOPHAGEAL ECHOCARDIOGRAPHY COMPLICATIONS IN CARDIAC SURGERY
Primary & Presenting Author: Razvan Purza, University of Manitoba, Winnipeg, Manitoba
Co-Author(s): Subhamay Ghosh, Chris Walker, Brett Hiebert, Lillian Koley, Scott Mackenzie, Hilary Grocott

150158 - LIPID REVERSES HYPOTENSION BUT NOT ANESTHESIC PROFILE OF PROPOFOL
Primary & Presenting Author: Ferrante S. Gragasin, University of Alberta, Edmonton, Alberta
Co-Author(s): Sareh Panahi, Rohan Mittal, Conrad Moher, Stephane Bourque

151037 - TYPE OF ANESTHESIA AND TRANS-CATHETER AORTIC VALVE IMPLANTATION
Primary & Presenting Author: Carla Andrea. Luzzi, UHN - Toronto General Hospital, Toronto, Ontario
Co-Author(s): David Orlov, George Djaiani, Massimiliano Meineri, Coimbatore Srinivas, Robert James Cusimano, Jo Carroll, David Orlov, George Djaiani, Coimbatore Srinivas, Massimiliano Meineri, Jo Carroll, Robert Cusimano

151475 - POTENTIAL NOVEL BIOMARKERS OF PERIOPERATIVE ACUTE KIDNEY INJURY
Primary & Presenting Author: Tlchaendepi Mundangepfupfu, King's College London and King's College Hospital and University of Rochester, Rochester, New York
Co-Author(s): Xiaoke Yin, James Clark, Manuel Mayr, Michael Marber, Gudrun Kunst
151541 - POSTOPERATIVE ATRIAL FIBRILLATION IN CARDIAC SURGERY PATIENTS
Presenting Author: Jean Abboud, University of Ottawa Heart Institute, Ottawa, Ontario
Primary Author: Diem T. T. Tran, University of Ottawa Heart Institute, Ottawa, Ontario
Co-Author(s): Denyse Winch, Madhuri Thommandru, Ethan Newton, Houman Rashidian

151847 - INTRAOPERATIVE HYPOTENSION AND STROKE AFTER MAJOR CARDIAC SURGERY
Presenting Author: Amy M. Chung, The University of Ottawa School of Medicine, Ottawa, Ontario
Primary Author: Louise Y. Sun, Division of Cardiac Anesthesia, University of Ottawa Heart Institute, Ottawa, Ontario
Co-Author(s): George Wells, Alomgir Hossain, Michael Bourke

152836 - DESIGN AND ASSESSMENT OF PATIENT SPECIFIC, DYNAMIC MITRAL VALVE MODEL
Presenting Author: John Moore, Western University, London, Ontario
Co-Author(s): Daniel Bainbridge, Terry Peters

153215 - ASSOCIATION BETWEEN LOW BIS VALUES AND PATIENT OUTCOMES IN CARDIAC SURGERY
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PURPOSE/BACKGROUND
Transesophageal echocardiography (TEE) has played an increasingly important role during cardiac surgery. Although there have been several large reviews documenting the complications following intraoperative TEE, most of the prior reports are almost two decades old and may not reflect current practices. The purpose of this study was to determine the incidence and types of complications following TEE in a contemporary cardiac surgical population.

METHODS
Following Research Ethics Board approval, we conducted a retrospective analysis of all cardiac surgical patients having undergone an intraoperative TEE between April 1, 2004 and April 30, 2012. Those who may have suffered a complication related to TEE were identified from our institutional cardiac surgical database using the patient discharge ICD-10 codes related to dysphagia, vocal cord and laryngeal injury, dysphonia, accidental puncture and laceration during a procedure, and hemorrhage and hematoma complicating a procedure. In addition, any case that had a requirement for postoperative bronchoscopy, or consultation with otolaryngology, the gastrointestinal (GI) bleed team, general or thoracic surgery due to a complication potentially related to TEE injury were flagged for manual chart review. Cases that were subsequently identified by investigator consensus as having complications potentially related to TEE were compared to all the cases in the cardiac surgical database during the same time period for which no TEE complication was reported. A multivariable model was developed to identify risk factors for TEE complications.
RESULTS
7,954 cardiac surgical cases were performed during the study period of which 1,074 had ICD-10 codes that triggered a manual review for potential TEE complications. Of the 111 (1.4%) cases subsequently identified with possible TEE-related complications, 24 (0.3%) experienced dysphagia requiring intervention, 73 (0.9%) experienced esophageal and/or gastric complications. Our multivariable analysis (see Table) showed an increased risk of complications associated with age (OR 1.04 per year), BMI (OR 0.94 per unit), previous CVA or TIA (OR 3.67), procedure other than isolated CABG (OR 2.09), EF < 35% (OR 1.71) and CPB time (OR 1.01 per minute).

CONCLUSION
The overall incidence of complications following cardiac surgery related to intraoperative TEE was relatively low at 1.4%. Advanced age, low BMI, complexity of procedure, prior CVA or TIA, EF < 35% and prolonged bypass time appear to be significant risk factors for complications.

References:
INTRODUCTION
Propofol is a commonly used anesthetic. Despite its favourable safety profile, propofol causes hypotension which ultimately can result in end-organ hypoperfusion. Intralipid is a lipid emulsion that has been successfully used to treat systemic toxicity from a variety of lipophilic medications, most notably local anesthetics. The mechanisms of action may include the “lipid sink” phenomenon, whereby lipophilic medications are removed from their sites of action and partition into a plasma lipid phase established by the lipid emulsion. Propofol is a lipophilic medication, and intralipid can reverse the vasodilatory effects of propofol in isolated vessels; however, whether these effects are recapitulated in vivo is not known. The objective of this study was to determine if intralipid reverses the hypotensive effects of propofol when administered in vivo. In addition, given the lipid sink theory for intralipid’s mechanism of action, we sought to determine if intralipid reverses the anesthetic effects of propofol, which may contribute to the reversal of the hypotensive effects of propofol in vivo. We hypothesize that intralipid reverses propofol-induced hypotension which is a result of reversing propofol’s anesthetic effects by virtue of the lipid sink phenomenon.

METHODS
This study was approved by the Animal Policy and Welfare Committee at our institution. Under isoflurane anesthesia, male Sprague Dawley rats were instrumented with indwelling catheters in the femoral artery and femoral vein for mean arterial pressure (MAP) assessments and intravenous drug delivery, respectively. In addition, subdural electrodes for cortical activity assessments by electroencephalography (EEG) were utilized. Finally, ultra-performance liquid chromatography (UPLC) was used to determine change in plasma concentrations of propofol over time with intralipid or saline administration.
Propofol (10 mg/kg IV, the typical IV anesthetic dose used in rats) caused hypotension (55±2% drop in MAP, P < 0.001) and intralipid (4mL/kg IV) caused greater reversal (80±9%) of blood pressures compared to saline (19±1%; P < 0.001). Blockade of the autonomic nervous system with chlorisondamine (2.5 mg/kg IV) caused marked hypotension (56±3% lowering of MAP, P < 0.001) which could be reversed with a constant infusion of phenylephrine (300 μg/kg/hr); under these conditions, propofol nevertheless caused hypotension (12±4% lowering of MAP) which was completely reversed by intralipid. Propofol-induced cortical burst suppression was not affected by intralipid (2±3%), saline (-4%) or 20% albumin (-2±1%; P=0.27). Finally, UPLC revealed an increase in plasma propofol concentration in the presence of intralipid compared to saline; however, propofol elimination in both groups coincided with EEG recovery.

DISCUSSION
These results demonstrate that intralipid reverses propofol-mediated hypotension with minimal effects on its anesthetic profile, suggesting other in vivo mechanisms besides a lipid sink may be involved. Intralipid could be particularly useful as a rescue against propofol-induced hypotension in patients prone to hemodynamic instability such as the elderly, without significantly altering their anesthetic state.

References:

INTRODUCTION
The purpose of this study was to compare postoperative outcomes after general anesthesia (GA) with tracheal intubation and conscious sedation with dexmedetomidine in patients undergoing trans-femoral trans-catheter aortic valve implantation (TAVI) procedures. We hypothesized that conscious sedation with dexmedetomidine would be a non-inferior anesthetic modality compared to historical controls with GA approach.

METHODS
After the Research Ethics Board approval, a prospective cohort of 50 consecutive patients undergoing trans-femoral TAVI under conscious sedation with dexmedetomidine (DEX group) were matched by age and sex on 1:1 basis with 50 historical controls receiving general anesthesia (GA group). In the GA group, anesthesia was induced with fentanyl 1-3mg/kg, and propofol 0.5-2mg/kg. Tracheal intubation was facilitated with rocuronium 0.6mg/kg. Anesthesia was maintained with isoflurane 0.5-2.0%, or sevoflurane 1.5-2.5%. In DEX group, patients received dexmedetomidine bolus 0.4-1μg/kg over 10-20min followed by an infusion 0.5-1.4μg/kg/h until the end of procedure. Transesophageal and transthoracic echocardiography were utilized in GA and DEX groups respectively. Both groups were compared with respect to demographic data, past medical history, medications, surgical characteristics, postoperative morbidity and mortality, and length of hospital stay. Statistical analysis was performed on the intent-to-treat basis. P < 0.05 was considered statistically significant.
RESULTS
Both groups were similar with respect to demographic data and surgical characteristics. Four patients in DEX group were converted to GA during the TAVI procedure. All patients in GA group were extubated in the operating room (OR). The OR times were $133 \pm 42\text{min}$ in DEX group vs $158 \pm 41\text{min}$ in GA group, $p=0.0036$. There was no difference with respect to postoperative morbidity and mortality between the two groups. (Table) The median difference in hospital length of stay was 2 days favoring DEX group, however, this difference did not reach statistical significance, $p =0.07$.

CONCLUSIONS
Conscious sedation with dexmedetomidine resulted in a non-inferior anesthetic modality compared to historical controls with general anesthesia approach. Potential benefits included shorter OR times and expedited hospital discharge.

References:
1 - J Cardiothorac Vasc Anesth 2014 8: 285-289
3 - Minerva Anesthesiol 2010 76:100-108
4 - Anaesthesia 2011 66: 977-982
5 - Hellenic J Cardiol 2010 51: 492-500
6 - Catheter Cardiovasc Interv 2008 72: 1012-1015
BACKGROUND AND GOAL OF STUDY
Acute kidney injury (AKI) is very common after cardiac surgery with an incidence of up to 30% and severe AKI results in a 4-fold increase in mortality. There is demand for specific and sensitive kidney injury markers, which would lead to earlier postoperative diagnosis and treatment of AKI. We propose a novel systematic proteomic analytic approach for identifying serum markers of AKI. In this model isolated kidneys are perfused with crystalloid buffer on a Langendorff apparatus and are either exposed to ischemia or not (control). Venous effluent samples, devoid of proteins other than the ones released from the tissue of interest, are collected for proteomic analysis.

MATERIALS AND METHODS
Local ethics committee approval for the use of animals was obtained prior to beginning the study. Adult male Sprague Dawley rats were used for the isolated perfused kidney (IPK) experiments. The right kidney was isolated and the renal artery and vein were both cannulated. Kidneys were extracted and perfused ex-vivo at 37°C by gravity flow at a pressure of 100 mmHg. Kidneys were perfused through the renal artery with a Krebs buffer gassed with 95% oxygen and 5% carbon dioxide for 30 minutes after isolation, to washout any blood and serum proteins. After washout four kidneys were subjected to no flow ischemia for 30 minutes (Ischemia group), then re-perfused with oxygenated buffer and four kidneys underwent time matched oxygenated perfusion (control group). After 60 minutes from the start of perfusion venous effluent, samples from the renal vein were collected for proteomic analysis.

RESULTS AND DISCUSSION
Venous effluent samples in the ischaemia and control groups were analysed by proteomics; cystatin C and uromodulin were identified as potential biomarkers of renal ischemia. Uromodulin is a protein of renal origin and was verified in the venous effluent samples by western blot. Cystatin C is found in all tissues and is a known functional biomarker of AKI.
CONCLUSION
The aim of this study was to identify specific and sensitive serum biomarkers for perioperative AKI. Uromodulin was identified as one potential renal specific serum marker in the IPK model, as described above. These results may now be helpful for further assessments of serum markers in patients with postoperative AKI.

References:

INTRODUCTION
Postoperative atrial fibrillation (POAF) is still a prevalent cardiac surgery complication that is associated with increased risk of important comorbidities and mortality. This study looked at the epidemiology of patients who had no prior history of atrial fibrillation during their hospital stay after cardiac surgery.

METHODS
Approval was obtained from our institutional Research Ethics Board. This is a prospective observational cohort study of 1416 adult patients undergoing non-emergent coronary artery bypass grafting (CABG) and/or valve surgery at a single cardiac hospital between 2014 and 2015. Univariate analysis was performed using Chi-square analysis and Student’s t-test to determine risk factors that are predictive of new onset POAF.

RESULTS
A total of 486 (34.3%) patients developed new onset POAF. Patients who had POAF were older (69.3 ± 9.7 vs 64.12 ± 11.4 years, p < 0.001), had lower creatinine clearance (84.7 ± 33.6 vs 93.7 ± 38.8 mL/hour, p < 0.001), underwent valve surgery (47.5 vs 35.6%, p < 0.001), and larger left atrial volumes (34.7 ± 13.0 vs 31.4 ± 11.9 mL/m², p < 0.001) than those who did not develop POAF. The incidence of postoperative complications was significantly higher in the POAF group for readmission to the ICU (6.4 vs 1.1%, p < 0.001), reintubation (4.3 vs 1.3%, p < 0.001), prolonged intubation (> 48 hours; 5.8 vs 1.6%, p < 0.001), cardiogenic pulmonary edema (5.1 vs 1.1%, p < 0.001), time spent in ICU (2.96 ± 5.2 vs 1.89 ± 3.7 days, p < 0.001), length of hospital stay (12.5 ± 12.4 vs 7.9 ± 7.1 days, p < 0.001), acute renal injury (20.4% vs 8.4%, p < 0.001), and need for at least one of red blood cells, platelets, or fresh frozen plasma (16.0 vs 11.8%, p < 0.05). We did not find a significant difference in stroke (1.4 vs 0.5%, p > 0.05), seizure (1.4 vs 0.5%, p > 0.05), malignant arrhythmia (4.9 vs 3.0%, p > 0.05), gastrointestinal bleeding (1.0 vs 0.5%, p > 0.05), heart block (4.5 vs 3.0%, p > 0.05), and death (1.2 vs 0.9%, p > 0.05).
DISCUSSIONS
New onset POAF remains a prevalent complication in the cardiac surgery population, associated with significant perioperative morbidity. This study demonstrated key characteristics of the population of patients undergoing cardiac surgery who develop new onset POAF and the expected complications that can follow.

References:

INTRODUCTION
Cerebrovascular accidents (CVAs) occur in 1.8-9.7% of patients undergoing major cardiac surgery and represent a serious postoperative complication. While intraoperative hypotension (IOH) is thought to play a role, no model to date has addressed the combined effect of IOH pre-, during and post-cardiopulmonary bypass (CPB). We investigated whether varying magnitudes and durations of IOH pre-, during and post-CPB were associated with postoperative CVA.

METHODS
Following local research ethics board approval, we conducted a retrospective cohort study of 7779 patients undergoing major cardiac surgery requiring CPB between November 2009 and June 2014. Patients undergoing off pump procedures were excluded. The primary exposures were, separately, longest durations of MAP < 55, 65 and 75 mm Hg; pre-, during and post-CPB. The primary outcome was postoperative ischemic CVA, defined as new focal or global neurologic deficit of cerebrovascular origin lasting ≥ 24h and non-hemorrhagic in nature. The diagnosis of CVA was verified by reviewing reported postoperative brain CT or MRI studies. Intraoperative invasive blood pressure measurements were recorded every 15 seconds in an electronic patient record, with any artifacts removed using an automated algorithm. The relationship between hypotension and CVA was modeled using logistic regression with propensity score adjustment. Independent CVA risk factors were identified through a non-parsimonious logistic regression model. Measure of association was OR (95% CI). All analyses were conducted using SAS 9.4, with statistical significance defined by a 2-tailed P< 0.05.

RESULTS
CVAs occurred in 148 patients (1.9%) and were associated with any duration of MAP < 75 mmHg during CPB. Specifically, each additional 10 min of IOH with MAP < 55 mmHg was associated with a 17% increased odds of CVAs (propensity-adjusted OR 1.17; 95% CI, 1.07-1.28). Each additional 10 min of MAP < 65 and MAP < 75 were associated with 9% (propensity-adjusted OR 1.09; 95% CI, 1.03-1.16) and 5% (propensity-adjusted OR 1.05; 95% CI, 1.01-1.10) increased odds of CVAs, respectively. Pre- and post-CPB IOH were not associated with CVA (Table). Other independent CVA risk factors included older age, combined valve and bypass surgery, surgery on the thoracic aorta, emergent surgery, preoperative shock, cooling while on bypass, hemodynamic instability post bypass despite administration of vasopressors and inotropes, new onset postoperative atrial arrhythmias, and reopening following surgery.

DISCUSSION
In this propensity-adjusted analysis, MAP < 75 mmHg during CPB is associated with postoperative CVAs, with evidence of a dose-response relationship with increasing severity and duration of hypotension. The ability to define critical thresholds and durations of hypotension associated with ischemic brain injury may lead to prompt preventative interventions. This study thus provides impetus for future research to develop a personalized goal-directed therapy for high-risk cardiac surgical patients.

References:

1. Stroke 2006;37:2306-2311
2. Stroke 2006;37:562-571
152836 - DESIGN AND ASSESSMENT OF PATIENT SPECIFIC, DYNAMIC MITRAL VALVE MODEL

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INTRODUCTION
Mitral valve disease is a common pathological problem occurring in over 2% of the population [1] with many requiring surgical intervention to restore normal valve function. In many instances, complex pathological conditions may make repair more difficult and the suitability of one approach over another may be unclear.
In this study, we propose the use of 3D printing technology in concert with image processing software to create dynamic, patient specific mitral valve models from pre-procedure TEE data. The long term goal is to use these models to simulate different repair/replacement options prior to patient intervention. In this study, the characteristics of our 3D models are validated by comparison of the patient’s original echocardiography (2D ultrasound, 3D ultrasound, and Colour Doppler), with the equivalent images form the model.

METHODS
Following approval from the local Research Ethics Board, a retrospective study was performed using pre-operative patient 3D TEE data to create 3D geometric models of the valve. These models were adapted to fit into a dynamic heart phantom [2]. Rigid 3D models of the valves were printed and then used to create silicone valves with a modified injection molding technique, with sutures to mimic the valve chordae. The valve was then inserted into the LV phantom which functions as a dynamic beating heart allowing dynamic TEE imaging of the mitral valve. TEE image data was acquired for comparison to the original patient data.

RESULTS
To date we have acquired patient image data and completed one (of ten) mitral valve models (Figure 1). 2D ultrasound data were similar between the model and actual patient’s images, although the leaflet thickness was greater on the model compared to patient images. 3D imaging of the model and patient valve appeared similar. Regurgitation occurred in a similar position on both the model and original TEE images based on color Doppler, however the degree of regurgitation appeared greater in the model compared to the patient.
DISCUSSION
We have demonstrated a workflow to create a patient specific, dynamic mitral valve model based on 3D TEE data. Current challenges include determining an optimal method to create the model, and the optimal material from which to form the valve. The ultimate aim is to create a dynamic model in which surgical approaches to the mitral valve may be tested, and the optimal approach identified. This work represents a first and important step to achieve this goal.

References:
2. SPIE Medical Imaging, 2015, 941503-941503-10.
ASSOCIATION BETWEEN LOW BIS VALUES AND PATIENT OUTCOMES IN CARDIAC SURGERY

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INTRODUCTION
Recent observational trials in the non cardiac surgical setting have associated low processed EEG values with poor perioperative outcomes However, this relationship has not been assessed in cardiac surgical patients where management of anaesthetic depth is uniquely challenged by patient co-morbidities, physiologic goals, and alterations in pharmacokinetics and pharmacodynamics seen with CPB. We sought to determine the association of intraoperative BIS values on important postoperative outcomes.

METHODS
Following institutional REB approval, a retrospective database review was undertaken. All patients undergoing major cardiac surgical procedures with CPB between July 1, 2012 and June 30, 2015 were included. Patients who underwent emergency surgery, hypothermic circulatory arrest, or had ketamine administered were excluded. Post anesthetic induction BIS values (processed with a resolution of 15 seconds) were extracted from archived electronic anesthesia records and individually linked with our institutional perioperative database. Logistic regression analyses were then performed to assess the association of average BIS value per case and delirium occurring in the ICU, length of ventilation, length of ICU stay and in-hospital mortality. For each outcome, we fitted a model that included other known baseline demographic and intra-operative predictors of outcome as shown in Table.

RESULTS
2372 patients were included in the analysis. Median ICU LOS was 1 day (0.9-2.7 IQR); 62 patients were diagnosed with delirium (3.5%) and 32 patients died in hospital (1.8 %). Average BIS values per case were normally distributed with a per case mean of 40.0 ± 6.14. On logistic regression BIS was an independent predictor of delirium occurring in the ICU ($p = 0.007$) but was not an independent predictor of length of ventilation, length of ICU stay or in-hospital mortality.
DISCUSSION
This is the first large scale study of the association of BIS values in cardiac surgical patients with post operative outcomes. Low BIS values are associated with an increased incidence of delirium but not other outcomes measured in this study. It remains to be seen whether there is a threshold value for BIS that is associated with poor outcomes in this patient population and whether intraoperative management of BIS values can alter these outcomes.

References:


CRITICAL CARE MEDICINE AND TRAUMA POSTER DISCUSSION
Sunday, June 26
10:15 AM - 12:00 PM

Moderator: Faisal S. Siddiqui, University of Manitoba, Winnipeg, Manitoba
Moderator: Brad Merriman

152636 - ARTIFICIAL VENTILATION IN A SIMULATED PEDIATRIC TRANSPORT MODEL
Presenting Author: Malcolm J. Lucy, University of Saskatchewan, Saskatoon, Saskatchewan

Co-Author(s): Jonathan Gamble, Andrew Peeling, Jimmy Lam

152769 - HUMANE ENDPOINTS IN ALI: A SYSTEMATIC REVIEW FOR A NATIONAL CONSENSUS
Presenting Author: Manoj M. Lalu, Regenerative Medicine Program, The Ottawa Hospital Research Institute, Ottawa, Ontario
Primary Author: Ryan McGinn, Faculty of Medicine, University of Ottawa, Ottawa, Ontario

Co-Author(s): Duncan Stewart, Lauralyn McIntyre, Gilly Griffin, Dean A. Fergusson, Carly C. Barron, Ryan McGinn, Duncan Stewart, Lauralyn McIntyre, Gilly Griffin, Dean Fergusson, Carly Barron, Manoj Lalu

152971 - TRANSFUSION TRIGGERS IN CRITICAL CARE AND SURGERY: A META-ANALYSIS
Primary & Presenting Author: Matthew A. Chong, University of Western Ontario, Scarborough, Ontario

Co-Author(s): Rohin Krishnan, Janet Martin, Rohin Krishnan, Janet Martin

153304 - HYDROXYETHYL STARCH IN PRECLINICAL SEPSIS: SYSTEMATIC REVIEW AND METAANALYSIS
Presenting Author: Manoj M. Lalu, Regenerative Medicine Program, The Ottawa Hospital Research Institute, Ottawa, Ontario
Primary Author: Yuan Yi Dong, UOttawa, Ottawa, Ontario

Co-Author(s): Lauralyn McIntyre, Dean A. Fergusson, Noah Kosowski, Carly C. Barron, Osman Ahmed, Chrisitna Pugliese
ARTIFICIAL VENTILATION IN A SIMULATED PEDIATRIC TRANSPORT MODEL

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INTRODUCTION
Positive-pressure ventilation (PPV) in critically-ill patients is commonly administered via a manual resuscitation device or a mechanical ventilator during transport. Strict PPV pressure targets reduces patient morbidity and mortality in this population (1). Few studies have directly compared delivered ventilation parameters amongst the various models of manual resuscitators or against mechanical ventilators. Our group previously compared delivered ventilation parameters between a self-inflating resuscitator (SIR) and a flow-inflating resuscitator (FIR) during simulated in-hospital pediatric transport. However, unequal group access to inline pressure manometry may have biased our results (2). Further, the relative performance of mechanical ventilators is unknown. In this study, we examined the performance of the SIR and FIR, both equipped with inline manometry, and several mechanical ventilators to deliver prescribed ventilation parameters during simulated pediatric transport.

METHODS
Local research ethics board approval and participant consent was obtained. Subjects were randomized in a crossover fashion to hand ventilate a test lung while simultaneously maneuvering a stretcher bed beginning with either a Jackson-Rees circuit (FIR) or a Laerdal pediatric silicone resuscitator (SIR) both employing manometers. The scenario was repeated using several mechanical transport ventilators, five times each, (Hamilton T1, Pulmonetic LTV 1000, LTV 1200). The primary outcome was the proportion of total breaths delivered within the predefined target PIP/PEEP range (30 +/- 3, 10 +/- 3 cm H2O). Secondary outcomes included proportion of total breaths delivered with operationally defined unacceptable breath variables (PIP >35 or PEEP < 5). Chi-squared testing was used for statistical analysis.
RESULTS
A total of 30 participants were recruited into the study (16 Staff Anesthetists, 10 Residents, 4 Anesthesia Assistants). The Hamilton T1 outperformed both manual resuscitators and other mechanical ventilators with a total proportion of breaths within target of 100% (p < 0.001) and no breaths classified as unacceptable (P < 0.001.) Of the manual resuscitators, the FIR outperformed the SIR among all subjects both in terms of total proportion of breaths within target range (27% versus 19.1%, p < 0.001) as well as total proportion of unacceptable breaths (41.1% versus 51.2%, p < 0.001). None of either LTV model breaths were within target range, and all of the LTV 1200 breaths were classified as unacceptable (Figure 1).

DISCUSSION
This study demonstrates that the Hamilton T1 mechanical ventilator clearly outperforms the other PPV methods with respect to delivery of important ventilation parameters. The FIR outperforms the SIR, and both the hand manual resuscitators outperform the LTV 1000 and 1200. The LTV data shows very precise but inaccurate ventilation pressure delivery, which may represent calibration error.

References:
INTRODUCTION
The mechanisms of organ failure and death in acute respiratory distress syndrome are unknown. Therefore, rigorous preclinical studies of acute lung injury (ALI) with a focus on severe and late stages of disease, are needed to evaluate novel therapies. This leads to unresolved animal welfare issues since true death is not routinely accepted as an experimental endpoint. Instead, surrogate humane endpoints of death are used as they are thought to minimize suffering while allowing a valid assessment. To date, there is no consensus regarding surrogate humane endpoints of death in preclinical ALI. Prior to engaging key stakeholders in a consensus process, we undertook a systematic search to identify existing guidance for surrogate humane endpoints of death in small animal models of ALI.
METHODS
A systematic search of Medline and Embase was performed in collaboration with an information specialist (inception–09/2015). Retrieved citations were screened and general study characteristics were extracted independently in duplicate. Primary studies, reviews, and editorials providing guidance for humane endpoints in small animal models of ALI and critical illness (e.g. sepsis) were included.

RESULTS
Our search retrieved 1744 citations and 10 articles met eligibility criteria; 7 were primary studies and 3 were review articles (including 1 consensus statement for animal models of sepsis). These articles examined ALI (7 articles) and other models of critical illness (3) in small animals models (6) and large animal models (4). Four articles identified body temperature as a surrogate humane endpoint (surface [ < 28.8°C], oral [ < 32.0°C] or rectal [ < 32.0°C]). Similarly, 3 articles reported the percentage of body weight lost (>20%) and/or appetite as useful endpoints. Fur cleaning behaviour (e.g. presence of piloerection or rough hair coat) and hunched posture were identified as surrogate endpoints by 3 and 2 articles, respectively. Finally, 2 articles suggested severe dyspnea or altered breath sounds as humane endpoints. Additional suggested endpoints included blood pressure (exact pressure not specified), animal activity, closed eyelids when stimulated, the presence of biochemical evidence of organ failure (biomarkers not defined) and an 8-point composite score (endpoint suggested by 1 article each). Eight of 10 endpoints lacked a quantitative method for objective assessment and none were prospectively validated.

CONCLUSIONS
This is the first systematic review of the humane endpoints for preclinical ALI. Although several surrogate humane endpoints were identified, none have been prospectively validated. This highlights the need for consensus guidelines to develop humane endpoints that can be applied in ALI studies across laboratories. Decreasing the variability in endpoints will improve generalizability of preclinical studies. This may increase preclinical to clinical translation of novel clinical therapies.

References:
N/A
INTRODUCTION
After the landmark Transfusion Requirements in Critical Care Trial,¹ there has been much interest in the risks and benefits of restrictive versus liberal transfusion thresholds in the critical care and perioperative settings. Given the clinical importance and conflicting evidence base,²-⁵ we sought to perform an updated meta-analysis to address whether outcomes differ for surgical versus critical care patients.

METHODS
Comprehensive searches of Medline, Embase, and the Cochrane Library were performed up to 15 October 2015 to identify randomized controlled trials (RCT) of adult surgical or critically-ill patients receiving a liberal versus restrictive transfusion strategy that reported mortality. The primary outcome was 30-day all-cause mortality, separately sub-grouped by surgical or critical care patients. Secondary outcomes included 90-day mortality, morbidity, blood volume transfused, and hospital length of stay. Two researchers independently extracted study demographics, outcomes, and assessed study quality. Random effects meta-analysis was performed to derive odds ratios (OR) and weighted mean differences (WMD), including 95% confidence intervals. The test for interaction across subgroups was used to assess differences in effect size. Additionally, a priori subgroup analyses included type of surgery (cardiac and non-cardiac).

RESULTS
The search retrieved 6055 citations, with 25 RCTs (10617 patients) meeting the inclusion criteria. Eleven trials were in the critically-ill and 14 were in perioperative patients. In critical care patients, the restrictive transfusion strategy resulted in significantly reduced 30-day mortality compared with a liberal transfusion strategy (OR 0.82; 95% CI 0.69-0.99; NNT=33; Figure). However, in surgical patients, the restrictive transfusion strategy led to the opposite direction of effect for 30-day mortality (OR 1.33; 95% CI 0.96-1.84; Figure). The test for interaction across the critical care and surgical subgroups was significant (p=0.034), suggesting that the effect sizes differ between the two. With regard to secondary outcomes, sub-group
analysis of perioperative patients by type of surgery revealed a higher risk of myocardial infarction among non-cardiac surgery patients receiving a restrictive transfusion strategy (OR 1.66; 95% CI 1.01-2.70; NNTH=120). No other significant differences between the transfusion strategies were found for hospital length of stay or other secondary outcomes, including the remaining tests for interaction between subgroups. Overall, the liberal protocol patients received more blood compared to restricted protocol patients (WMD 1.5 units; 95% CI 1.1-1.8 units; p < 0.001). Statistical evidence of publication bias was not found and 11/25 RCTs were high quality.

DISCUSSION
The available evidence suggests that a restrictive transfusion strategy significantly reduces the risk of 30-day all-cause mortality in critical care patients, but not in perioperative patients. Whether a restrictive transfusion strategy increases mortality in the perioperative setting remains to be definitively delineated by adequately powered RCTs, particularly in high-risk patients.

References:

[1] NEJM(1999);340:409-417
[5] NEJM(2013);368;(1)11-21
INTRODUCTION
Hydroxyethyl starch (HES) fluid resuscitation has recently been demonstrated to increase in mortality and acute kidney injury in patients with septic shock. It is unclear whether an analysis of preclinical HES studies may have helped predict the adverse effects of these fluids. We therefore conducted a preclinical systematic review and meta-analysis to investigate the safety of HES compared to other resuscitation fluids in animal models of sepsis. Here we report on the outcome of mortality.

METHODS
A systematic search of Ovid MEDLINE and Embase was performed in collaboration with an information specialist (inception-01/2015). Citations were screened independently in duplicate. Studies comparing HES vs other resuscitation fluid in preclinical in vivo sepsis models were included. The Cochrane Risk of Bias Assessment Tool was used to assess internal validity of each included study. Construct validity (i.e. clinical generalizability) was assessed using a previously proposed 8 point framework. Results are expressed as risk ratios (RR) and 95% confidence intervals (95% CI). Meta-analysis was performed using an inverse variance random effects model. A priori determined outcome ascertainment windows were also analyzed (≤2 days, 2-4 days, ≥4 days).
RESULT
10 articles met eligibility criteria (n=439 animals). Animal models included rat (5 studies), swine (3), and sheep (2). To model disease, studies used IV endotoxin (4), cecal ligation and puncture (3), live bacteria implant (1), live bacteria infusion (1), and fecal peritonitis (1). Comparison fluids included gelatin (5), ringer’s lactate/acetate (5), saline (3), sterofundin (2), albumin (1), and pig plasma (1). Risk of bias was variable: 8 studies reported randomizing but did not describe the method, no studies described allocation concealment, personnel and outcome assessment were low risk of bias in 4 and 2 studies, respectively. Studies incorporated a median of 2 (range 1-4) of 8 suggested construct validity criteria to increase clinical relevance (e.g. no studies included animals with comorbidities). Mortality of animals was described in 6 studies and no statistically significant effect of HES on mortality was noted (RR 1.45, 95%CI 0.75-2.75, $I^2 = 43\%$). One study reported on animals ≥4 days, with 7/7 animals treated with HES and 0/7 treated with plasma dying, respectively.

CONCLUSION
There is a paucity of preclinical evidence regarding the long term safety of HES in animal models of sepsis. Available evidence suffered from variably risk of bias and potentially lower construct validity. Pooled analysis suggested a non-significant trend towards harm with HES. The single study performed with a longer outcome ascertainment window demonstrated harm with HES.

References:
1. JAMA 2013 309:678-688
2. Crit Care Med 2010 38:2401-2408
EDUCATION AND SIMULATION POSTER DISCUSSION
Saturday, June 25
13:00 - 14:45 PM

Moderators:
Dr Peter Ramon-Moliner, University of Sherbrooke
Dr Jordan Tarshis, Sunnybrook Health Sciences Centre

140763 - POWER AND CONFLICT: CAN RESIDENTS CHALLENGE AUTHORITY DURING A CRISIS
Primary & Presenting Author: Zeev Friedman, Mount Sinai Hospital, University of Toronto, Toronto, Ontario
Co-Author(s): Sev Perelman, Meghan Andrews, Duncan McLuckie, Laura Noble, Archana Malavade, Dylan Bould

143302 - DOES TWITTER ENABLE ANESTHESIOLOGISTS' HIGHER ORDER THINKING?
Primary & Presenting Author: Clyde Matava, Hospital for Sick Children, University of Toronto, Toronto, Ontario
Co-Author(s): Matthew Le, Nathan Budgen, Fahad Alam

144752 - LEARNING BEHAVIORS OF MEDICAL CLERKS DURING OPERATING ROOM ROTATIONS
Primary & Presenting Author: Colin Hamlin, Anesthesia and Perioperative Medicine, University of Manitoba, Winnipeg, Manitoba
Co-Author(s): Alexander Villafranca, Sandra Robinson, Peter Benoit, Thomas Rodebaugh, Eric Jacobsohn

148825 - APPLYING A QUALITY LENS TO CASE REPORTS IN ANESTHESIA
Primary & Presenting Author: Ekta Khemani, Western University Department of Anesthesia and Perioperative Medicine, Mississauga, Oregon
Co-Author(s): Brieanne McConnell, Zachary Davidson, Bethany Oeming, Sandy Girgis, Sean O'Byrne, Clyde Matava
152204 - SIMULATION-BASED ASSESSMENT: A MULTI-CENTRE VALIDATION STUDY
Primary & Presenting Author: Tobias Everett, The Hospital for Sick Children, University of Toronto, Toronto, Ontario
Co-Author(s): Ralph MacKinnon, Elaine Ng, Neil Cowie, Pradeep Kulkarni, Bruno Borges, Michael Letal, Melinda Fleming, Dylan Bould

152741 - FOCUSED CARDIAC ULTRASOUND TRAINING IN CANADIAN RESIDENCY PROGRAMS
Primary & Presenting Author: Rob Tanzola, Kingston General Hospital, Queen's University, KINGSTON, Ontario
Co-Author(s): Glenio Mizubuti, Anthony Ho, Mike Cummings, Allard Rene

152889 - ANESTHESIA EDUCATION IN HAITI: A NEEDS ASSESSMENT
Presenting Author: Heather O'Reilly, Memorial University, St. John's, Newfoundland and Labrador
Primary Author: Shannon Lockhart, University of British Columbia, Vancouver, British Columbia
Co-Author(s): James Kim, Sonia Sampson

153029 - 3D PRINTED HEART MODEL FOR TEACHING FOCUSED CARDIAC ULTRASOUND VIEWS
Primary & Presenting Author: Massimiliano Meineri, UHN - Toronto general Hospital, Toronto, Ontario
Co-Author(s): Josh Qua Hiansen, Matt Ratto, Eitan Aziza, Stephanie Zhou, Azad Mashari, Josh Qua Hiansen, Matt Ratto, Eitan Aziza, Stephanie Zhou, Azad Mashari
INTRODUCTION
Effective communication is crucial during life threatening crisis situations. Hierarchy is deeply engrained in the culture of medicine, is especially prominent when involving attending physicians and residents, and can result in failures of effective communication. Previous research has shown that residents were unable to effectively challenge a superior’s wrong decision during a crisis situation. Failure to challenge authority is a problem that can contribute to preventable mortality. The objective of the study was to assess whether a teaching intervention affected the ability of residents to appropriately and effectively challenge clearly wrong clinical decisions made by their staff during a simulated emergency airway life threatening scenario.

METHODS
Following local ethics board approval, second year residents were randomized to receive a teaching intervention targeting the cognitive and interpersonal skills needed to monitor and challenge a superior’s decision, or a control group which received a general instruction on crisis management. The intervention included the use of 4 crisis resource management tools: The five-step assertive statement process, the 2 challenge rule, the CUS communication tool (Concerned-Uncomfortable-Safety) and the DESC conflict resolution and assertiveness script (Describe-Explain-Share-Compromise). Two weeks later, subjects participated in a simulated crisis (disconnected from the teaching session and unrelated to it) that presented them with five distinct situational opportunities to challenge a staff regarding a clearly wrong decision in a life threatening (can’t intubate can’t ventilate) scenario. Deliberate deception was used: residents were told that staff/resident teamwork was being evaluated and it was only disclosed that the staff was a confederate at the end of the simulation session during the debriefing. Performances were video recorded and later assessed and scored in random order by two trained independent raters blinded to group allocation and unfamiliar with the subjects using the modified Advocacy-Inquiry Score (mAIS).
RESULTS
Fifty one residents were recruited and 50 completed the study. One video was excluded because of technical issues. All of the trainees had comparable previous experience participating in simulation. The inter-rater reliability of the mAIS scores among raters (ICC=0.87, 95% CI: (0.70, 0.94)) was excellent. The median (IQR [range]) of the maximal mAIS (our primary outcome) across all challenging opportunities and averaged out across raters was significantly better in the intervention group 5.0 (4.50-5.62 [4-6]) than in the control group 3.5 (3.0-4.75 [3-6]) (p

DISCUSSION
The results of this study demonstrate that a short targeted teaching intervention was effective (and clinically meaningful) in significantly improving residents' ability to challenge a wrong decision by a superior. This suggests that residents are not given the proper tools to challenge authority during a life threatening crisis situation. This educational gap can have significant implications for patients' safety. Incorporating a similar intervention into the residency curriculum may address this problem and improve team work during crisis management.

References:
1. Anaesthesia. 2015;70:1119-29
BACKGROUND
The use of social media is increasing, in social and professional contexts including anesthesia, on a variety of platforms that include Twitter; however, the scope and breadth of its use in #anesthesia has not previously been reported. AIMS: To determine the frequency, sentiment and trend of Twitter 'tweets' containing anesthesiology identifiers (hashtags) were prospectively tracked and analyzed over a 60 day period. We aimed to determine the level of higher order engagement of anesthesiologists using twitter.

METHODS
This study was exempt from IRB. Tweets with the hashtags #anesthesia, #anesthesiology, #anaesthesia were prospectively tracked and analyzed from Feb 1, 2015 to March 31st, 2015 using a social media analysis tool, CyBrand. Data were analyzed for tweet volume, frequency, sender, content analysis, sentiment and acceleration and factors associated with use. An evaluative analysis using Bloom’s digital taxonomy was used to assess the level of higher order discourse in twitter. Descriptive statistics were used to summarize data, Chi-Square and univariate analysis for factors associated with use and retweeting.

RESULTS
A total of 4021 tweets with #anesthesia hashtags were sent by 1698 unique Twitter accounts between Feb 1, 2015 and March 31, 2015. These made a total of 8 million impressions. The largest single tweeters by volume were companies/industry (27% of tweets), while individual anesthesiologists contributed to forty percent of tweets. Content analysis showed that 34% of tweets provided scientific information, 30% were commentary, 5% were sharing experiences and 10% were advertisements. Overall, 20% tweets were part of conversations including academic/scientific topics. About 75% of tweets had positive sentiment. 80% of tweets demonstrated the lowest order on cognitive processes of Bloom’s digital taxonomy. 10% of tweets demonstrated higher levels (analyse, evaluate and create).
CONCLUSIONS
A lot of discussion and content about #anesthesia is taking place on Twitter, and the majority of this is positive. Social media presents a novel opportunity for engagement and ongoing dialogue with public and professional groups. Higher order thinking and discourse can be demonstrated on twitter with 140 characters or less. Further studies are warranted to quantify the quality of interactions and how they translate to patient care.

References:

INTRODUCTION
Medical schools have an interest in promoting positive learning behaviors in their students. Measuring these learning behaviors can be useful when circumstances do not permit the evaluation of the earning outcomes. Previous research on learning behaviors has focused on medical residents\(^1\) or were not specific to operating room (OR) rotations.\(^2\) We therefore developed a survey tool to measure medical clerk learning behaviors during OR rotations. We then used this tool to generate a preliminary description of the learning behaviors in a sample of medical clerks in the USA and Canada.

METHODS
A cognitive model called “brain-based learning” guided question generation.\(^3\) Pretesting included cognitive interviews with five medical clerks and consultation with nine operating room staff and two psychometricians. The questionnaire received REB approval. We distributed the survey to senior medical students in a sample of Canadian and US medical schools. Exploratory factor analysis was used to refine the model. Reliability was assessed using Cronbach’s alpha. Basic descriptive statistics for each learning behavior type were calculated. A Friedman’s test with a Wilcoxon follow-up evaluated differences in the frequencies of the learning behaviors.

RESULTS
A total of 543 medical students completed the survey. The final model had four categories of learning behaviors (three positive and one negative); these were preparatory behaviors performed in anticipation of a curriculum activity (5 items, alpha=0.822), active role behaviors carried out during official learning activities (6 items, alpha=0.795), reflective behaviors occurring after such activities (5 items, alpha=0.789), and a group of avoidant behaviors involving a purposeful evasion of learning activities (4 items, alpha=0.675). Reliability was acceptable to good. Inter-item correlations indicated a lack of question redundancy. The primary finding of the survey was that active role behaviors were significantly the most frequently endorsed type of learning behavior (Figure 1).
DISCUSSION
We have created a tool to measure the learning behaviors of medical clerks during OR rotations. The tool can be used to describe medical clerk learning and may help inform educational interventions. A number of factors may explain the prevalence of active role behaviors, including the likelihood that preparatory and reflective behaviors require an additional time commitment, and that participating in operating room activities is perceived as necessary to ensure that preceptors maintain a positive view of the student.  

References:

BACKGROUND
Case reports have historically helped shape the education and field of anesthesia, but have recently been met with controversy in their contribution to evidence based medicine (EBM). Moreover, the Canadian Institute for Health Research (CIHR) advocates that medical knowledge should be synthesized into review articles and guidelines before shaping clinical practice to improve the quality of medical knowledge and education\(^1\). In 2013, Case Report (CARE) guidelines were instituted to improve quality in case reports, yet little is known on how published case reports score on these guidelines. Even less is known on the impact of case reports in medial literature. We performed a systematic review of published anesthesia case reports to identify their quality, literary impact (particularly for review articles and clinical guidelines), and factors associated with high citation rates.

METHODS
This systematic review was exempt from REB approval. Case reports published in Anesthesiology and Anesthesia & Analgesia, from 2007 to 2012 (n=540) were identified using MEDLINE and EMBASE. Following the application of predetermined exclusion criteria, 261 case reports were included for data extraction. Two reviewers independently scored each case report using the CARE guidelines thirty-item checklist. Literary impact was defined as the total number of citations, the average citation frequency, and type of publication citing them. Web of Science was used to find the citation information. Untoward events reported in case reports were evaluated using the Anesthesia Quality Institute (AQI) anesthesia adverse events and near-misses framework. The relationship between the AQI scores and number of citations was analyzed, specifically looking for scores with high citation rates (>10). Quantitative data was analyzed using descriptive statistics and non-parametric tests as appropriate. Factors associated with high citation rates were identified using multivariate analysis.
RESULTS
The mean CARE score for the case reports is 19.6 + 6.4/30, with a median score of 20. The 261 case reports included in our study were cited a total of 2054 times, with a median citation frequency of 4.0 per case report, and 21% of the case reports having high citations (>10). Review articles and guidelines comprised 33% and 3% of all citations respectively (see Figure 1). Factors that were significant for high citations included type of anesthetic and unanticipated difficult airway, $P=0.0092$ and $P=0.0082$ respectively.

CONCLUSION
Case reports seem to have a significant impact in the anesthesia literature, as they are frequently cited in review articles and clinical guidelines. These synthesized knowledge tools are often used in teaching materials for anesthesia education. However, the quality of case reports needs improvement. Given the role of case reports in anesthesia education and its use in EBM, the introduction of CARE guidelines represents a quality improvement opportunity in case reporting.

References:

INTRODUCTION

Worldwide there is increasing interest and implementation of multi-modal assessments of physician competence. This may be in the context of maintenance of licensure or evaluation of readiness for progression through the stages of postgraduate medical training. High-stakes simulation-based assessments (i.e. ones which are potentially progression-limiting) are already established in some jurisdictions. In 2015, The Royal College of Physicians and Surgeons of Canada moved to "Competence by Design", which involves the evolution of formative assessment tools to include simulation milestones. Building on our previous work in this field, we conducted an international multi-centre prospective validation study of simulation-based assessment tools in pediatric anesthesia as applied to a full range of anesthesia practitioners, from junior residents to veteran Staff. This represents the largest scale study of this topic to date.

METHODS

Research ethics board approval was obtained at each of nine centres in Canada and the UK. Participants were recruited to engage in the Managing Emergencies in Pediatric Anesthesia (MEPA) simulation course which consists of seven core scenarios covering high-stakes, low-frequency crises in pediatric anesthesia. The process of design and rigorous validation of the scenario content has been described elsewhere. Participant demographics were collected, including duration of training and experience in anesthesia and pediatric anesthesia. Performances were video recorded. Five expert raters were trained to use two tools for rating each scenario - a scenario-specific checklist (CL) and a global rating scale (GRS). A large random sample of the total video pool were rated by all the raters in order to establish their inter-rater reliability. The remaining videos were divided between the raters for solo rating. Correlations were sought between grade of practitioner and performance, in order to make arguments for the construct validity of our tools in this context.
RESULTS
Over an 18 month period, we collected data on 469 simulation encounters. 140 videos (twenty of each of seven scenarios) were rated by all the raters. Table 1 shows the reliability (by scenario and overall) as measured by the intraclass correlation coefficient (ICC). Despite the slight variation in reliability by scenario, the reliability of the CL and GRS is substantial and overall is near-perfect. Importantly, the GRS which eliminates scenario content specificity (and is designed to distinguish practitioners ready for independent practice from those who aren't) shows excellent reliability. The close correlation between practitioner grade and performance shows that our tools are well-placed to distinguish novice from expert and stratify those grades in between.

CONCLUSION
The MEPA GRS has been adopted as the principal outcome measure for the Canadian National Anesthesia Curriculum. This study provides further validity evidence for its use in the context of these simulation-based formative assessment of residents’ readiness for independent practice.

References:
INTRODUCTION
Focused cardiac ultrasound (FoCUS) is being increasingly used by anesthesiologists to assess patients perioperatively. Accordingly, FoCUS training has recently been incorporated into some Canadian anesthesiology residency programs. While a recent study demonstrated that FoCUS training in US anesthesiology training programs is uncommon, little is known about the particulars of this training across Canada. Given the value of perioperative FoCUS and the likelihood that it will eventually become a mandatory part of residency training, the purpose of this study is to assess the current state of FoCUS training in anesthesiology residency programs in Canada.

METHODS
Local research ethics committee approval was obtained. A survey was sent by mail and email to the 17 Canadian program directors of anesthesiology residency training programs.

RESULTS
Twelve of 17 (70.6%) surveys were returned. All but one program (91.7%) felt FoCUS training should be mandatory. Nine programs (75%) currently have mandatory (25%), elective (25%), or medicine elective (25%) rotations in FoCUS. The remaining 3 programs have teaching in FoCUS, but no formal rotation. Supervision of training was exclusively performed by anesthesiologists in 5 programs (41.7%), anesthesiologists in combination with cardiologists or intensivists in 5 programs (41.7%), and by non-anesthesiology specialists in 2 programs (16.7%). Minimum targets for FoCUS studies performed during training existed in 5 programs (41.7%) with the average target being 49.2 studies (range 25 to 90). Details of the amount and type of didactic training are presented in Table 1. Programs with a mandatory rotation all had didactic training greater than 20 hours and a required minimum number of studies performed. Identified barriers to implementation of a FoCUS program included the lack of the following: manpower (50%), expertise (41.7%), a standardized curriculum and standardized training requirements (33%), and necessary equipment (25%).
DISCUSSION
There is high variability in training of FoCUS among Canadian anesthesiology residency training programs. Program directors do, however, recognize its importance for future anesthesiologists, with a large majority offering formal or elective rotations. Most programs offer at least 10 hours of didactic training. Some experts propose that basic FoCUS competence can be achieved with as little as 12 hours of didactic and practical training(3) and these levels are currently surpassed by a majority of the programs. Although no minimum requirements for training currently exist for perioperative FoCUS(4), programs with a formal rotation surpass recent Canadian recommendations for FoCUS training in critical care(5). This study highlights the need for a formal national curriculum and minimum training requirements, which would in turn help with the country-wide adoption of effective FoCUS training in anesthesiology residency programs across Canada. Further efforts will be needed, however, to address other identified barriers to implementation.

References:
2. http://dx.doi.org/10.1053/j.jvca.2015.05.111
INTRODUCTION
The developing world faces many obstacles to the delivery of safe perioperative care. Anesthesia mortality in developing countries is estimated to be at least 100 times greater than developed nations(1). These high numbers are attributed to inadequate monitoring, medication, blood supplies and access to adequately trained anesthesia providers(2). Reviews of anesthesia in developing countries focus on the need to improve education and infrastructure(1). Experts agree that in-country training is paramount to building the experience necessary to practice in resource-poor conditions(3). To form lasting relationships that foster continued education exchange, it is imperative to deliver education that the recipient country requests(2). This study was designed to determine Haitian-identified areas of need with respect to anesthesia education with the goal of developing a supplemental curriculum to be delivered by volunteer educators.

METHODS
A survey was developed, reviewed by local research ethics, and administered to Haitian anesthesia residents, and their teachers, training at two different hospitals in Haiti. Focus groups were then held and residents interviewed about their difficult experiences. Data was reviewed to identify competencies and deficiencies in anesthesia education, infrastructure and resources as compared to the Canadian Anesthesia National Curriculum and WHO Global Initiative for Emergency and Essential Surgical Care.

RESULTS
Responses were received from twenty anesthesia residents, and two anesthetists, representing two anesthesia programs. Residents identified deficiencies in education concerning monitoring and equipment, pediatric, obstetric, hematologic and renal pathophysiology, regional anesthesia, ethics, management of the difficult airway, trauma, resuscitation, critical care, and postoperative care. All participants had access to computers and internet however none were aware of the WFSA online education resource. 85% had access to a recent edition of Miller’s Anesthesia. Practice in spinal anesthesia was identified as a strength of training in Haiti; limited resources and infrastructure were identified as weaknesses. Pulse oximetry, ketamine, thiopental,
halothane, oxytocin, spinal anesthetic, and epinephrine were usually available, while, ETCO2 monitoring, a defibrillator, difficult airway equipment, chest tubes, emergency surgical airway equipment, newer volatile agents, calcium, ergotamine and tranexamic acid were rarely available. Access to blood gas analysis, x-ray, ultrasound and blood bank services was also identified as limited.

DISCUSSION
According to anesthetists and residents surveyed, Haiti lacks some essential resources deemed necessary by the WHO Global Initiative for Emergency and Essential Surgical Care(4). The country is rebuilding after the 2010 earthquake, and many doctors are currently enrolled in anesthesia education programs. While not comprehensive according to Canadian standards, these programs are providing essential training to resilient, dedicated and eager learners. The deficiencies in education, infrastructure and resources identified draw attention to the resource-poor conditions faced by anesthesia practitioners in Haiti and will help focus volunteer education and fundraising efforts.

References:

4. WHO Global Initiative for Emergency and Essential Surgical Care (www.who.int/surgery/globalinitiative/en)
153029 - 3D PRINTED HEART MODEL FOR TEACHING FOCUSED CARDIAC ULTRASOUND VIEWS

Author(s)
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BACKGROUND
Focused Cardiac Ultrasound (FCU) is become integral part of clinical assessment in many acute care areas including anesthesia and perioperative care.

FCU consists of obtaining as five transthoracic cardiac views and integrate the information obtained into the clinical assessment [1].

The complex three dimensional structure of the heart poses a great challenge in understanding the orientation of the ultrasound plane of cut in respect to each cardiac structure.

Continued cost-reduction of commercially available 3D printers represents a viable method to produce customized medical-anatomical models. Coupled together with free, open-source 3D modelling/image segmentation software enables the fabrication of highly detailed and accurate, yet inexpensive, medical-anatomical models for education and training. This case study hypothesizes that a 3D printer-centric workflow can produce a detailed and useful training module understanding FCU views.

METHODS
After REB approval, an anonimized patient DICOM CT scan of a normal heart was selected. The heart was semi-automatically segmented using open-source medical segmentation tool ITK-SNAP™. Models were imported into free 3D printing slicing Meshmixer™ and sliced along the standard FCU views' ultrasound plane of cut (Parasternal long axis, short axis and four chambers). The obtained files were exported as a .gcode toolpath file describing speed, temperature and geometric details necessary for 3D printing. The models were finally uploaded to a fused deposition modelling 3D printer, Series 1 Pro by Type A Machines, for fabrication.
A parametric model of a phased array adult transthoracic cardiac probe was also created with a transparent ultrasound plane of cut. After printing, accuracy of the models was assessed by two staff anesthesiologists (MM, AM) and was visually compared with online 3D model [2].

RESULTS
The three heart models (Fig.1) were deemed accurate and provided an enhanced feeling of the three-dimensional structure of the heart most useful for teaching and self-learning. Accounting only for raw mass of materials used, each patient-specific models cost approximately $13.40 CAD.

CONCLUSIONS
Minimal software costs and low model cost has made it possible to fabricate accurate model of the heart from real patient’s 3D data. Infrastructure required for the 3D printers will continue to see reductions in cost and once established can be used to rapidly produce other customized medical models. Future studies will test the impact of these models on learning cardiac anatomy and ultrasound planes of cut.

References:


2. www.pie.med.utoronto.ca
HEALTH MANAGEMENT POSTER DISCUSSION
Sunday, June 26
10:15 AM - 12:00 PM

Moderators:
Dr. Brad Merriman, University of British Columbia
Dr. Faisal Siddiqui, University of Manitoba

143495 - HOSPITAL VOLUME AND SURVIVAL FOR FRAIL ELECTIVE SURGERY PATIENTS
Primary Author: Daniel I. McIsaac, University of Ottawa, Ottawa, Ontario
Co-Author(s): Duminda Wijeysundera, Gregory Bryson, Carl van Walraven

151018 - ERAS: ARE WE MAKING THE MARK? A QUALITY IMPROVEMENT INITIATIVE
Primary & Presenting Author: Ekta Khemani, Western University Department of Anesthesia and Perioperative Medicine, Mississauga, Oregon
Co-Author(s): Daryl Gray, Mark Czuczman, Charlotte Dawson, Benjamin Flesher, Fatemah Qasem, Ian McConachie, Kelly Vogt, Karen Dunn, Ken Leslie

152105 - OUTCOMES IN HIGHER RISK PATIENTS UNDERGOING CANCER SURGERY - AN AUDIT
Presenting Author: Madhavi Shetmahajan, Tata Memorial Hospital, Mumbai, India, Mumbai, India
Co-Author(s): Deepika Menon

152620 - ADHERENCE TO COMPONENTS OF AN ERAS PROTOCOL AFTER IMPLEMENTATION
Primary & Presenting Author: Kelly V. Mayson, Vancouver General Hospital, Department of Anesthesia and Perioperative Care, UBC, Vancouver, British Columbia
Co-Author(s): Liam Stobart, Andrea Bisallion, Tracey Hong
INTRODUCTION
Frailty is a syndrome based on age- and disease-related deficits that accumulate across multiple domains. Frailty is a risk factor for morbidity, mortality, and increased healthcare resource use. With the rapid aging of the Canadian population, improving the outcomes of frail surgical patients is a priority for the healthcare system.

Hospitals and surgeons that perform higher volumes of specific surgeries generally have better outcomes than low volume providers. This volume-outcome relationship is often attributed to improved structures and processes of care at high-volume centers. Since frail patients are sensitive to structures and processes of care, we hypothesized that frail patients having elective surgery at hospitals that cared for a higher volume of similarly frail elective surgical patients would have lower rates of postoperative mortality, complications, and failure to rescue (FTR).

METHODS
Following ethical approval, we conducted a population-based historical cohort study. We identified all episodes of adult elective, intermediate- to high-risk non-cardiac surgical care from 2002-2014; frailty status was confirmed using the validated Johns Hopkins ACG frailty indicator. Our cohort was limited to frail patients, and analysis was limited to the first surgery for each frail patient. The number of frail patients operated on at each hospital in the year before each patient’s surgery was calculated; hospitals were divided into frailty volume quintiles. We estimated the adjusted association between frailty volume and 90-day postoperative survival using a multivariable proportional hazards regression model that accounted for clustering in individual hospitals, patient characteristics, comorbidities, procedural risk, baseline health resource use, and total hospital surgical volume. The association of frailty volume with complication and FTR rates was analyzed using multivariable logistic regression.
RESULTS
We identified 63,381 frail patients, of whom 1,491 (2.4%) died in the 90 days after surgery. There was a dose-response improvement in postoperative survival for frail patients with each increase in hospital volume quintile (highest quintile vs. lowest: HR=0.65, 95% CI 0.50-0.85, see figure). Higher frailty volume hospitals also had lower complication rates, and significantly lower FTR rates (highest quintile vs. lowest: OR=0.41, 95%CI 0.21-0.77).

DISCUSSION
Frail patients who have elective surgery at hospitals that care for higher volumes of frail patients have improved postoperative survival. This is at least partly explained by lower failure to rescue rates, which may indicate better structures and process of care. Concentration of perioperative care in centers that frequently care for high-risk frail patients could improve outcomes; further study of this association is warranted.

References:
(1) J Gerontol: Med Sci 56: 146-157
(2) Age Ageing 2006 35: 551-552
(4) JAMA Surgery 2016 (epub ahead of print Jan 20)
(5) NEJM 2015 373: 1388-1390
INTRODUCTION

Enhanced Recovery After Surgery (ERAS) is a multimodal approach to enable faster recovery and fewer complications for patients having elective surgery. Successful implementation requires a collaborative, multidisciplinary approach that empowers patients. Review of hospitals initiating ERAS programs showed the greatest benefit when centres consistently and cohesively followed a confirmed ERAS protocol. Collaboration of healthcare disciplines was a key aspect to successful implementation, resulting in faster recovery and fewer complications for patients. Specifically, the perioperative expertise of anesthesiologists plays a valuable role in improving ERAS. Since ERAS was initiated at our institution, a formal audit has not been done. The study’s aim is to evaluate the ERAS program for elective colorectal surgery patients at our institution through comparison with provincial averages. An ongoing goal of our study is to institute a multidisciplinary quality improvement initiative that aligns with the goals of the provincial ERAS Quality Based Procedures (QBP) for Colorectal Cancer Surgery.

METHODS

REB approval was obtained. A retrospective review of all patients (n=94) undergoing elective colorectal surgery at our institution from January 2015 (the implementation of ERAS at our institution) to December 2015 was performed. Length of in-hospital stay (LOS) was the primary outcome. Patients were classified into four procedure categories: 1) laparoscopic colon, 2) open colon, 3) laparoscopic rectum and 4) open rectum. LOS was compared in each of these categories to provincial averages in 2013-2014.
RESULTS
The mean LOS in days for each group is as follows: 1) Laparoscopic colon 6.13 + 2.99, 2) open colon 6.38 + 2.19, 3) laparoscopic rectum 7.20 + 4.09, and 4) open rectum 11.42 + 6.72. The median LOS for each group is as follows: 1) Laparoscopic colon 5.0, 2) open colon 6.0, 3) laparoscopic rectum 5.0, and 4) open rectum 10.0. The provincial averages and median LOS in 2013-2014 as well as the QBP targets can be found in Figure 1.

DISCUSSION
Our institution is not meeting ERAS provincial averages or the QBP targets for LOS, with the exception of open colon cancer surgeries. This is concerning given that cost associated with an extended LOS. Consequently, an ongoing multidisciplinary quality improvement initiative was initiated, targeting opportunities highlighted in the QBP clinical pathway. Interventions included educational grand rounds on fluid management to anesthesiologists, a multidisciplinary audit and feedback session, as well as technical interventions such as distinctive labeling of ERAS patients, updating automated order sets for ERAS patients, and ERAS checklists. Optimizing pain management perioperatively was also a major quality improvement initiative. Interventions involved all members of the healthcare team: anesthesiologists, surgeons, nurses, and physiotherapists. Results of these initiatives and its effect on LOS at our institution are being monitored in real-time.

References:


INTRODUCTION
Patients with severe systemic disease pose increased risk for perioperative morbidity and mortality. With advances in medical care, increasing number of such high risk patients are presenting for major cancer surgery. We conducted this study to understand the incidence of ASA physical status 3 and above presenting for cancer surgery, their progress through the perioperative period and their outcome in terms of morbidity and mortality.

METHODOLOGY
This prospective observational study was conducted in a tertiary care cancer centre after obtaining approval from institutional review board who granted waiver of consent. All patients classified as American Society of Anesthesiologists Physical Status (ASA PS) grade III and above presenting for elective and emergency cancer surgery were studied. Data was collected from the patients’ case notes and electronic medical record. The primary endpoint was in-hospital mortality.

RESULTS
130 patients classified as ASA III and above presented for cancer surgery over 6 months, of which 30 patients underwent emergency surgery. 50% of patients were more than 55 years old. 28% patients presented for gastrointestinal (GI) surgery followed by maxillofacial and urogenital surgery (20% each).

The salient features in the high risk patients are given in the table. 50% elective surgery patients required medical optimization and needed more than 1 week to obtain fitness. 25% elective patients had an extended ICU / HDU stay. 7% patients required ICU readmission. 20% patients had a postoperative hospital stay of more than 2 weeks. 2 patients, both with cardiovascular high risk factors, died before discharge, one after thoracic surgery and other after GI surgery.
DISCUSSION
High risk patients underwent cancer surgery in our institute with a 2% and 37 % mortality in elective and emergency surgeries respectively which is similar to that described in literature for non cancer surgeries. 90 % patients were ASA III suggesting medical optimization in most of the elective cases prior to surgery. Many needed multispeciality reference/s for evaluation and therapeutic interventions. 33% needed a change in oncological management plan. Whether this impacted on their oncological outcome was not studied, which is a limitation of this study.
We conclude that elective cancer surgery in patients with optimized severe medical disease was not associated with a high mortality.

References:


ADHERENCE TO COMPONENTS OF AN ERAS PROTOCOL AFTER IMPLEMENTATION

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INTRODUCTION
A prior study had shown improved adherence to a standardized multimodal Enhanced Recovery After Surgery (ERAS) protocol was associated with improved clinical outcomes, indicating a dose-response relationship\(^1\). We studied the impact of the intraoperative management and adherence level, after implementing our local ERAS protocol on outcomes following major elective colorectal surgery.

METHODS
A multidisciplinary team implemented a full ERAS protocol at our single tertiary centre on November 1, 2013. After obtaining local ethics approval, the charts of 258 consecutive elective colorectal procedures performed between November 1, 2013 and February 28th, 2015 were audited. The adherence to the main anesthetic components were assessed: maintenance of normothermia, adequate postoperative nausea and vomiting (PONV) prophylaxis, timely administration of antibiotics, the use of multimodal analgesia (>2 non-opioid interventions), and the use of a monitor to provide goal-directed fluid therapy (GDFT). American College of Surgeons National Surgical Quality Improvement Program (ACS NSQIP) defined comorbidity and post-operative 30 day complications, surgical approach, and length of stay were also determined. The complication rate was compared between two cohorts, those that had an > 80% compliance to the described anesthetic ERAS components and those that had < 80% compliance. Results are descriptive and both cohorts were compared for continuous variables by independent samples t-tests or median tests and categorical variables by contingency tables, using Chi-squares statistics or Fisher's Exact tests.
RESULTS:
69% of our patients had > 80% compliance to the intraoperative components after initiating our ERAS protocol. The compliance for normothermia was 94.5%, timely administration of antibiotics 85.9%, adequate PONV prophylaxis 85.1%, use of multimodal analgesia 80.6%, and the use of a monitor to direct GDFT 50.8%. A minimally invasive (MIS) approach was performed in 71.7% of cases. 21.9% of these colorectal cases had at least one NSQIP complication. The demographics, and the incidence of major complications, and length of stay (LOS) are seen in Table 1. The two cohorts were comparable with regard to demographics, and there was a decrease in overall complications, and in pulmonary complications (pneumonia, re-intubation, ventilation > 48 hours), however no one specific complication reached statistical significance.

DISCUSSION
Our overall compliance to intraoperative ERAS components was high with the exception of GDFT. Intraoperative fluid therapy should aim to maintain a near-zero fluid balance and GDFT may be reserved for high risk patients and for procedures with significant intravascular fluid shifts\(^2\). Increased adherence to the intraoperative ERAS components show a trend to decreasing the incidence of major complications, and highlight the impact of the anesthetic management on postoperative morbidity.

References:
1. Arch Surg 2011 146:571-574
NEUROANESTHESIA POSTER DISCUSSION
Saturday, June 25
10:15 AM - 12:00 PM

Moderators:
Dr David Wong, University of Toronto
Dr Marie-Hélène Tremblay, Laval University

141517 - EFFECT OF DIFFERENT SURGICAL POSITIONS ON CEREBRAL VENOUS DRAINAGE
Presenting Author: Tze Yeng Yeoh, Department of Anesthesia, Toronto Western Hospital, Toronto, Ontario

Primary Author: Audrey Tan, Department of Anesthesia, Toronto Western Hospital, Toronto, Ontario

Co-Author(s): Pirjo Manninen, Vincent Chan, Lashmi Venkatraghavan, Lashmi Venkatraghavan

147165 - QUALITY AND BIAS OF PRE-CLINICAL ANESTHETIC NEUROPROTECTION STUDIES
Presenting Author: David Archer, The University of Calgary, Cumming School of Medicine, Department of Anesthesia, Calgary, Alberta

Primary Author: Ramana Appireddy, The University of Calgary, Cumming School of Medicine, Department of Clinical Neurosciences, Calgary, Alberta

Co-Author(s): Andrew Walker, Sarah McCann

148713 - PRE-CLINICAL META-ANALYSIS OF ANESTHETIC NEUROPROTECTION IN STROKE
Primary & Presenting Author: Andrew Walker, Department of Anesthesia, Cumming School of Medicine, University of Calgary, Calgary, Alberta

Co-Author(s): Ramana Appireddy, Sarah McCann, David Archer
149356 - ANESTHETIC NEUROPROTECTION IN PERMANENT PRE-CLINICAL STROKE MODELS

Presenting Author: David Archer, The University of Calgary, Cumming School of Medicine, Department of Anesthesia, Calgary, Alberta

Primary Author: Christopher Applewhaite, The University of Calgary, Cumming School of Medicine, Department of Anesthesia, Calgary, Alberta

Co-Author(s): Jennifer Mikhayel, Andrew Walker, Sarah McCann, David Archer
INTRODUCTION
The majority of cerebral venous blood flow passes through the internal jugular vein (IJV).¹ During neurosurgical procedures, patients are often placed in the park bench or prone position for surgical access. Excessive neck flexion and rotation may cause kinking of the IJV and obstruct cerebral venous blood flow resulting in intracranial pressure elevation.² The purpose of this pilot study was to measure the IJV blood flow of awake healthy volunteers, with the use of an ultrasound, in the supine, prone, and park bench positions. Our hypothesis was that there would be a decrease in the dependent IJV flow in the park bench position when compared to supine, but both IJV flows would remain unchanged in the supine and prone positions.

METHODS
After Institutional Research Ethics Board approval, we evaluated IJV flows bilaterally in healthy and awake adult volunteers. An informed consent was obtained from all participants who met the inclusion criteria. The IJV cross sectional area and Doppler velocity were measured in the supine, prone and right park bench positions. IJV blood flow was calculated using the formula: Flow (ml/min) = Cross sectional area (cm²) x Doppler velocity (cm/sec) x 60.³ Two independent investigators performed the measurements and inter-observer variability was calculated using Pearson’s correlation test.

RESULTS
Twenty-seven volunteers were recruited. There was no significant difference in both IJV flows between the supine and prone positions (Right IJV: 1430 ± 803 ml/min vs 1924 ± 1140 ml/min; P = 0.071; Left IJV: 1113 ± 578 ml/min vs 1178 ± 832 ml/min; P = 0.738). Similarly, we did not find any difference between both IJV flows in the right park bench position compared to supine (Right IJV: 1430 ± 803 ml/min vs 1403 ± 1006 ml/min; P = 0.914; Left IJV: 1113 ± 578 ml/min vs 1267 ± 960 ml/min; P = 0.478). There was good correlation for IJV cross sectional area measurements made by both investigators but
poorer correlation for velocity measurements.

**DISCUSSION AND CONCLUSIONS**
The IJV blood flow was not compromised by the prone or park bench positions in healthy volunteers breathing spontaneously. Our results suggest that careful positioning prevents kinking of the IJV and cerebral venous flow obstruction. However, future studies are required to determine if similar findings are obtained in anesthetized and ventilated neurosurgical patients.

**References:**

QUALITY AND BIAS OF PRE-CLINICAL ANESTHETIC NEUROPROTECTION STUDIES

Author(s)
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INTRODUCTION:
The failure of animal models of stroke to successfully identify clinically useful neuroprotective agents has led to reassessment of research methods\(^1\). Two of the ‘usual suspects’ that exaggerate effect size in preclinical studies are publication bias and study quality\(^2\). Here we evaluated the contribution of publication bias and poor study quality to the effect size estimate in pre-clinical studies of anesthetic neuroprotection in stroke.

METHODS
Studies were identified by systematic review of the literature finalized December 15, 2015. A search of databases Ovid and Embase identified 81 studies of focal cerebral ischemia in rats or mice that reported outcomes in terms of infarct volume or neurological deficit scores. Effect sizes were expressed as normalized mean difference (NMD)\(^3\); point estimates for NMD were determined by meta-analysis using a random effects model\(^4\). The estimated effects of publication bias were evaluated with funnel plots and Duval and Tweedie’s trim and fill method. Study quality was independently assessed by two investigators according to a modified CAMARADES score\(^1\) of 6 items: 1. monitoring of blood pressure and blood gases, 2. randomization to control or treatment group, 3. allocation concealment, 4. multi-level mechanistic study design, 5. statement regarding regulatory compliance, 6. conflict of interest statement. To examine the relationship between study quality and NMD we performed meta-regression analysis of NMD against modified CAMARADES score. Meta-analysis and meta-regression were performed with commercial software (Comprehensive Meta-Analysis - CMA™).
RESULTS
Publication bias: The mean reduction in neurologic injury by exposure to anesthetics (isoflurane, propofol, sevoflurane, desflurane, ketamine) was 27% (95% C.I. 22-31, k=81). The funnel plots for all studies, permanent ischemia (≥3h) and transient ischemia with treatment before (preconditioning) or after (postconditioning) the ischemic period are shown in the figure. The trim and fill method did not identify any missing studies to the left of the means, and no correction in the global estimate for unpublished studies was suggested. Study Quality: Meta-regression using modified CAMARADES score as the covariate showed an intercept of 27% with a coefficient for study quality of 5.4% (95% C.I. 1.5-9.4, k=81, P=0.004). This result indicates that the size of the neuroprotective effect increased with study quality.

DISCUSSION
The results do not support concerns that neuroprotective effects reported in preclinical studies of anesthetics have been exaggerated by poor study quality or publication bias. These findings support further meta-analysis of preclinical anesthetic studies to define the effects for anesthetics in the setting of focal ischemia.

References:
2. Nat Rev Neurosci 2013 14: 365-376
148713 - PRE-CLINICAL META-ANALYSIS OF ANESTHETIC NEUROPROTECTION IN STROKE

Author(s)
Andrew Walker
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INTRODUCTION
Endovascular stroke therapy (EST) has become the standard of care for acute ischemic stroke and despite lack of randomized clinical evidence supporting its use and recent guidelines, general anesthesia is still widely used for EST. We are not aware of any good quality clinical evidence to guide specific anesthetic selection in this setting, however anesthetics have been evaluated in an appropriate preclinical model of ischemia-reperfusion. Systematic reviews and meta-analysis can provide an overview of experimental findings and describe the size, direction and consistency of the effect of an intervention. Here we report the results of systematic review and meta-analysis of preclinical studies of anesthetic neuroprotection in acute stroke.

METHODS
Studies of anesthetic neuroprotection using the filament model of ischemia-reperfusion in rats or mice were identified by systematic review. A search of Ovid and Embase databases identified 81 studies of focal cerebral ischemia that reported outcomes in terms of infarct volume or neurologic deficit score or both. From this set, we identified 37 investigations of clinically relevant doses of the anesthetic administered during or after focal cerebral ischemia was induced. Study quality was evaluated by two independent investigators according to a modified CAMARADES score. Control conditions were scored for ‘neuroprotective potential’: sevoflurane, barbiturates, isoflurane, ketamine = 1, α-chloralose, chloral hydrate = 2, ‘awake’=3. Effect size was expressed as normalized mean difference (NMD); summary effect size was calculated by inverse variance weighting meta-analysis using a random effects model. The contributions of study quality, anesthetic and control condition to heterogeneity were assessed by meta-regression. Meta-analysis was performed with commercial software (Comprehensive Meta-Analysis ®).
RESULTS
Anesthetics reduced neurologic injury by 28% (95% C.I. 22-35%, Z=8.27, P=0.0000). Duval and Tweedie’s trim and fill method for publication bias adjusted the mean effect to 25% (19-32%) (Z=3.13, P=0.002). Heterogeneity was high between the studies (I$^2$=76.34). The meta-regression model accounted for 61% of the variance whereupon treatment and control anesthetics were significant covariates for effect size (Table). The ranking of the effect size for these covariate sets was - control state: (isoflurane, sevoflurane, barbiturates, ketamine) < (α-chloralose, chloral hydrate) < ‘awake’; anesthetic: isoflurane < propofol < sevoflurane.

CONCLUSIONS
The results show that isoflurane, sevoflurane and propofol reduce neurologic injury when administered during or after the onset of focal ischemia. The results were not substantially affected by publication bias or study quality. The greatest neuroprotection was observed in studies that used ‘awake’ control subjects.

References:
1. Ann Neurol 2015;78 doi10.10002/ana.24528
ANESTHETIC NEUROPROTECTION IN PERMANENT PRE-CLINICAL STROKE MODELS

INTRODUCTION
Anesthetics and sedatives are commonly used during the hyperacute management of ischemic stroke in order to facilitate physiological support and control of intracranial hypertension. The drugs used have potentially beneficial effects upon metabolism/blood flow ratios and molecular pathways involved in necrosis and apoptosis\(^1\). The contribution of pharmacological factors of anesthetics to clinical stroke outcome is not clear, and we are not aware of any good clinical evidence to guide specific anesthetic selection in this setting. Systematic reviews and meta-analysis can provide an overview of experimental findings and describe the size, direction and consistency of the intervention effect. Here we report the results of a systematic review and meta-analysis of preclinical studies of anesthetic neuroprotection in permanent focal ischemia.

METHODS:
Studies of anesthetic neuroprotection using the filament model of focal cerebral ischemia in rats or mice were identified by systematic review. A search of Ovid and Embase databases identified 13 studies that reported outcomes in terms of infarct volume or neurologic deficit score or both. Effect size was expressed as normalized mean difference (NMD)\(^2\); summary effect size was calculated by inverse variance weighting meta-analysis using a random effects model. When both neurologic deficit score and infarct volume were reported for the same animals, the average of the two measures was used. Meta-analysis and graphics were performed with RevMan 5.3 (http://tech.cochrane.org/revman). Publication bias was assessed with Duval and Tweedie’s trim and fill method.
RESULTS
The selected reports evaluated four anesthetics: propofol (5 studies), isoflurane (5 studies), sevoflurane (2 studies), ketamine (1 study). The average reduction in neurologic injury by exposure to an anesthetic was 24.5% (95% C.I. 19-30%, Z=9.246, P=0.0000) (Figure). The results were homogeneous, (I²=0.000) and there was no adjustment for publication bias suggested by Duval and Tweedie’s trim and fill method.

CONCLUSIONS
The results show that the anesthetics reduced neurologic injury by approximately 25% in the filament preclinical model of permanent focal ischemia. This finding is similar to the mean reduction in infarct size reported for non-anesthetic drugs (mean ± SE: 26% ± 0.2%)³. There was no evidence that the results were affected by publication bias. The present findings support the existence of a ‘baseline’ positive efficacy in this preclinical model, as suggested by O’Collins and colleagues⁴.

References:
OBSTETRIC POSTER DISCUSSION
Saturday, June 25
1:00 PM - 2:45 PM

Moderator: Clarita Margarido, University of Toronto, Toronto, Ontario
Moderator: Valérie Zaphiratos, Université de Montréal, Hôpital Maisonneuve-Rosemont, Montreal, Quebec

151293 - MASSIVE TRANSFUSION PROTOCOL AND CLINICAL OUTCOMES IN PPH
Presenting Author: Thiago Ribeiro, University Toronto, Toronto, Ontario
Primary Author: Clarita Margarido, University of Toronto, Toronto, Ontario
Co-Author(s): Stephen Halpern, Jasmine Djordjevic, Andrea Hards, Charles Knapp, Jeannie Callum

152092 - PHENYLEPHRINE & MATERNAL CARDIAC OUTPUT DURING PLANNED CESAREAN
Primary & Presenting Author: Abby Medniuk, BC Women's Hospital/Provincial Health Services Authority, Vancouver, British Columbia
Co-Author(s): Jonathan Collins, Simon Massey, Vit Gunka, Alison Dube

152914 - ULTRASOUND OF GASTRIC VOLUME IN PREGNANT WOMEN: A PREDICTIVE MODEL
Presenting Author: Cristian Arzola, Department of Anesthesia, Mount Sinai Hospital, University of Toronto, Toronto, Ontario
Co-Author(s): Anahi Perlas, Naveed Siddiqui, Philip Ye, Kristi Downey, Jose Carvalho

152991 - MYOMETRIAL CONTRACTILITY IN ADVANCED AGE AND MORBIDLY OBESE WOMEN
Primary & Presenting Author: Alice M. Luca, Mount Sinai Hospital, Toronto, Ontario
Co-Author(s): Jose Carvalho, Nivetha Ramachandran, Mrinalini Balki
152992 - LUMBAR SPINE ANATOMY IN PREGNANT WOMEN SUSTAINING DURAL PUNCTURE
Presenting Author: Jose Carvalho, University of Toronto, Toronto, Ontario
Primary Author: Nicholas Barret, Department of Anesthesia, Mount Sinai Hospital, University of Toronto, Toronto, Ontario
Co-Author(s): Cristian Arzola, Kristi Downey, Timo Krings

153056 - INTRAPERITONEAL LIDOCAINE INSTILLATION FOR POSTCESAREAN ANALGESIA
Presenting Author: Jose Carvalho, University of Toronto, Toronto, Ontario
Primary Author: Ruchira Patel, OB Anesthesia Fellow, Department of Anesthesia, Mount Sinai Hospital, University of Toronto, London, United Kingdom
Co-Author(s): Marcelo Kanczuk, Kristi Downey, Paul Bernstein, Naveed Siddiqui, Jose Carvalho, Marcelo Kanczuk, Kristi Downey, Paul Bernstein, Naveed Siddiqui

153083 - BARRIERS TO COLLABORATION: ANESTHESIOLOGISTS VS OBSTETRICAL NURSES
Presenting Author: Lillia Y. Fung, University of Toronto, Faculty of Medicine, Toronto, Ontario
Co-Author(s): Kristi Downey, Nancy Watts, Jose Carvalho

153165 - PROGRAMMED INTERMITTENT EPIDURAL BOLUS FOR LABOR ANALGESIA
Presenting Author: Jose Carvalho, University of Toronto, Toronto, Ontario
Primary Author: Marcelo Kanczuk, Department of Anesthesia, Mount Sinai Hospital, University of Toronto, Toronto, Ontario
Co-Author(s): Nicholas Barret, Cristian Arzola, Kristi Downey, Philip Ye, Marcelo Kanczuk, Nicholas Barrett, Cristian Arzola, Kristi Downey, Xiang Ye
INTRODUCTION
Over the past decade, Massive Transfusion Protocols (MTP) have been developed and proposed to advance the severe postpartum hemorrhage (PPH) management. MTPs main goal is to synchronize surgical, anesthesia, laboratory and blood bank responses in an immediate and sustainable manner. The MTPs clinical impact in obstetrics is yet to be determined. This study was undertaken to compare the massive transfusion management and clinical outcomes in a labor and delivery unit where MTP is implemented (MTP+) to a labor and delivery unit where no MTP is implemented (MTP-).

METHODS
After obtaining Local Research Ethics Boards approval, Health Record archives of two centres with more than 4000 deliveries a year, were approached to identify all hospitalization of patients that required at least 5 units of red blood cell (RBC) transfusion in the first 24 hours after delivery. In one centre, a specific obstetrical MTP was implemented and running (MTP+) and in the MTP- centre, no MTP was in place. The sampling method was a convenient one including all consecutive obstetric patients between September 2010 and January 2015. The period of time was chosen to comprise the period since when the MTP was implemented at the MTP+ centre. Demographic, Obstetrical, management data (hysterectomy, tranexamic acid usage, transfusion profile: number of units and FFP:RBC ratio) and outcomes (48 hours survival; mechanical ventilation, length of stay in ICU and hospital; sepsis, acute renal failure; acute respiratory distress syndrome and multiple organ failure) were extracted retrospectively from patient hospital records. Statistical analysis: Student t and Chi-square tests were applied when appropriate (SPSS V20 package; statistical significance at $P < 0.05$).
RESULTS
The main results are presented in Table 1. The 48 hours survival rate was 100% in both centres.

DISCUSSION
Considering the massive transfusion management, the main finding was that the frequency of tranexamic acid administration was significantly higher in the MTP+ centre (P=0.003). Of note, both centres presented low FFP:RBC transfusion ratio (below 0.5). In the MTP+ centre patients stayed longer in hospital but shorter in ICU (P=0.008 and P < 0.001, respectively). As it is a retrospective study, report bias and confounding factors cannot be ignored. Massive Transfusion in Obstetric is an important but rare event. Larger multicentre studies are warranted to determine the MTP clinical impact in obstetrical settings.

References:
2) IJOG 2012;21(3):230-5.
5) Transf 2014;54(7):1756-68.
INTRODUCTION
Spinal induced hypotension often requires intervention during cesarean delivery (CD). Prophylactic phenylephrine infusion (PI) may maintain normotension, however concern exists about compromise to maternal cardiac output (CO) at certain doses. Our objective was to observe the effect of PI, in the dose range used at our institution, on maternal CO using a non-invasive CO monitor (Nexfin™, Edwards Lifesciences LLC Canada).

METHOD
Ten healthy, consenting parturients undergoing elective CD were included. Local ethics board approval was granted. Following standardized spinal anesthesia, PI was commenced at 50mcg/minute and adjusted at the discretion of the attending anesthesiologist. In addition to standard monitoring, the Nexfin™ recorded CO, systemic vascular resistance (SVR) and heart rate (HR); no changes were made to the anesthetic on the basis of the Nexfin™ readings. Data are presented as percentage change from the pre-anesthetic baseline (T0=100%, when the spinal was administered), indexed to body surface area (CO is presented as CI, SVR is presented as SVRI).

RESULTS
50% of parturients experienced drop in CO < 80% of baseline, in 19% (28/150) of data points. The lowest recorded CI was 53.7% of baseline in one parturient; mean trends, before and after delivery, are shown in figure 1. The incidence of SVRI >2390 dynes.sec/cm^5/m^2 (upper limit of normal) was 25% (38/150) of data points.
CONCLUSION
Phenylephrine infusion running at 50mcgs/minute significantly increases maternal SVRI with simultaneous reduction in CO. HR and CO correlate directly, confirming previous work\textsuperscript{2}. This pilot study included a small number of parturients in uncontrolled conditions, so these results should interpreted with caution. However, the data reflect every day practice when CO monitoring is not routinely employed. Should we titrate PI to HR and symptoms rather than to systolic blood pressure?

References:


2. Anesthesiology 2009; 111:753–65
ULTRASOUND OF GASTRIC VOLUME IN PREGNANT WOMEN: A PREDICTIVE MODEL

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Kristi Downey - Mount Sinai Hospital
Jose Carvalho - Mount Sinai Hospital and University of Toronto

INTRODUCTION
Pulmonary aspiration of gastric content is one of the most feared complications in obstetric anesthesia. Bedside gastric ultrasonography (US) is a feasible imaging tool that can be reliably performed by anesthesiologiststo assess gastric content in the perioperative period.\textsuperscript{1,2} We studied the relationship between the gastric antral area assessed by US and the volume of clear fluids ingested aiming to develop a predictive model to estimate gastric volume.

METHODS
We obtained Local Ethics Committee approval and patient informed consent for participation in this randomized single-blinded study in non-laboring pregnant women at term. We used a standardized scanning protocol of the gastric antrum using a 2-5 MHz curvilinear array transducer in a sagittal to right parasagittal plane on the epigastric area. Subjects were on a 45-degree semi-recumbent position. Firstly, we performed a baseline qualitative assessment of the gastric content after an 8-hour fasting period in supine and in right lateral decubitus (RLD). Women were classified following a 3-point grading system (grade 0: no fluid; grade 1: fluid seen in RLD only; grade 2: fluid seen in both positions). Secondly, subjects were randomized to ingest one of 6 predetermined volumes of apple juice (0-50-100-200-300-400 ml). A quantitative assessment was carried out through a series of sonographic measurements of the cross-sectional area of the antrum (CSA) at baseline and after the volume ingestion. The anesthesiologist performing the US examinations was blinded to the volume allocation. Primary outcome: the relationship between antrum CSA and volume ingested were analyzed through Pearson correlation coefficients. Secondary outcome: multiple regression analysis was used to create a mathematical model to estimate gastric volume.
RESULTS
We examined 60 subjects. Preliminary results show that the CSA in RLD correlated well with volumes ingested (Pearson’s correlation $r=0.65$). Various mathematical models were tested statistically significant, which incorporate CSA in RLD and demographics such as age, gestational age, height and BMI (Coefficient of determination $R^2=0.42$ to 0.7).

DISCUSSION
Bedside gastric US is a feasible tool in the assessment of pregnant women. The antrum CSA correlates well with the volume ingested. We developed a predictive model to estimate gastric volumes based on antral CSA and patient demographics. The quantitative measurement of antral CSA is a promising tool. Further research is warranted to identify the best use of this point-of-care diagnostic modality.

References:
INTRODUCTION
Women with advanced maternal age (AMA) and morbid obesity (MO) are at a greater risk for postpartum hemorrhage (PPH). Oxytocin is the first line drug in the treatment of PPH. Prolonged exposure to oxytocin, as during labor augmentation, can result in the desensitization phenomenon. Desensitization is likely to result in poor uterine tone after delivery leading to PPH, with attenuated response to oxytocin. It is unknown if oxytocin desensitization specifically affects contractility in women with AMA and MO when compared to younger or normal weight populations. Further it is not known if the higher incidence of PPH seen in these women is due to poor uterine contractility. We aimed to investigate the effect of oxytocin desensitization on oxytocin-induced myometrial contractility in these patient populations.

METHODS
The in-vitro study was conducted after REB approval and written informed consent from patients undergoing elective cesarean deliveries. Three groups of patients were studied: control (≤35 yr, BMI 20–24.9 kg/m²), AMA (≥40 yr, BMI 20–24.9 kg/m²), and MO (≤35 yr, BMI ≥40 kg/m²). Myometrial tissue obtained from the uterine incision was dissected into six strips. Each strip was mounted in a single organ bath with physiological salt solution (PSS) and then pretreated with oxytocin 10⁻⁵ M (desensitization model) or left in PSS (untreated) for 2 hours. This was followed by a dose-response testing to oxytocin 10⁻¹⁰ M to 10⁻⁵ M. The primary outcome was motility index (MI: amplitude x frequency) of myometrial contractions. Data was analyzed using the % response during the dose response relative to the baseline contractions.

RESULTS
So far 126 experiments have been performed (required n=168) with samples from 33 women: control (n=56), AMA (n=48), MO (n=22). The MI, calculated as a cumulative dose-response average, was higher in the control group (457%) compared to the AMA (414%) and MO (321%) groups in samples not pretreated with oxytocin. In the oxytocin-pretreated samples, the MI was lower in the control group (111%) compared to the AMA (158%) and MO (281%) groups (Fig 1). We plan to complete this study by March 15, following recruitment of 7 more patients.
DISCUSSION
Our results validate the desensitization phenomenon, as the MI of oxytocin-induced contractions was higher in untreated than oxytocin-pretreated groups for all patient populations. In the absence of oxytocin pretreatment, women with AMA and MO exhibit poor oxytocin-induced myometrial contractility compared to the control group. While, in the setting of oxytocin-pretreatment, women with AMA and MO exhibit enhanced myometrial contractility compared to the control group. These results indicate that the higher incidence of PPH seen in AMA and MO patients may be due to not only the desensitization phenomenon, but also their poor intrinsic uterine contractility.

References:
2. Anesthesiology 2013; 119: 552-561
INTRODUCTION
Unintentional dural puncture is one of the most frequent complications of the epidural technique. One previous study suggested that atypical sonoanatomy of the ligamentum flavum-dura mater unit may be a risk factor for this complication; however, this study lacked confirmation by MRI. (1) The objective of this study was to describe the sonoanatomy of the lumbar spine, as assessed by both MRI and ultrasound, in women sustaining unintentional dural puncture during epidural catheter placement for labor analgesia.

METHODS
With institutional ethics committee approval and patient informed consent, we approached women who sustained a recognized unintentional dural puncture during labor epidural placement. Those agreeing to participate had detailed documentation of the technical aspects of the epidural placement, including: use of pre-procedural ultrasound assessment or palpation, number of attempts, overall difficulty of placement, level of placement and operator experience. An MRI of the lumbar spine was performed in the immediate postpartum period to investigate for any spinal abnormalities, particularly those of the ligamentum flavum and dura mater. Additionally, all women had their lumbar spine scanned with ultrasound in both transverse and longitudinal paramedian oblique views. Ultrasound images of the ligamentum flavum-dura mater unit in the transverse view were classified as typical, atypical or inconclusive. An atypical image was defined as that depicting all elements of the interspace, except for the ligamentum flavum-dura mater unit. (1) All MRI images were reviewed by a neuroradiologist, who was blinded to the ultrasound images and to the level at which the unintentional dural puncture occurred.
**RESULTS**
We included 10 women in the study. Half these punctures occurred despite experienced practitioners and no woman had an extremely low or high body mass index. The depth to loss of resistance varied from 4 to 6 cm; 9 punctures were at L3/4 and 1 at L2/3 level. Two women suffered two dural punctures each. Seven of the ten women developed postdural puncture headache and went on to have an epidural blood patch. Ultrasound imaging in the longitudinal paramedian oblique view produced typical images in all patients. However in the transverse view 7 of 10 women showed atypical or inconclusive scans, the atypical images being at either L4/5 or L5/S1 interspace. The MRI results for all women revealed no anatomical abnormalities, with the exception of 1 woman who had a ligamentum flavum gap left of midline at the L2/3 level (away from the puncture site).

**DISCUSSION**
Our results suggest that unintentional dural punctures occur in likely anatomically normal women. Furthermore, the transverse ultrasound views may fail to demonstrate typical ligamentum flavum-dura mater unit at the lower lumbar levels despite its confirmed presence by MRI.

**References:**

INTRODUCTION
The incidence of persistent pain after cesarean delivery is high.\(^1,2\) Acute severe pain following surgery is a strong predictor of chronic pain. Multimodal analgesia, including intraperitoneal instillation of local anesthetics has been shown to be effective in reducing postoperative pain.\(^3,4\) We sought to investigate the effect of intraperitoneal instillation of lidocaine at cesarean delivery on post-operative pain scores and maternal satisfaction, as part of a multimodal pain management strategy inclusive of intrathecal morphine.

METHODS
Following local ethics approval and informed consent, 204 healthy women scheduled for elective cesarean delivery under spinal anesthesia were recruited. After administration of standard spinal anesthetic (bupivacaine, fentanyl and morphine) patients were randomized into either a treatment (20 mL 2% lidocaine with epinephrine 1 in 200,00) or placebo (20 mL normal saline) group. The study solution was instilled into the peritoneum by the surgeon following uterine closure. The parietal peritoneum was left open or sutured depending on the preference of the obstetrician. Postoperative analgesia including standing orders of acetaminophen and diclofenac PO and PRN morphine/hydromorphone IV/SC was prescribed for both groups. The primary outcome was pain on movement at 24 hours measured on a visual analogue scale (VAS 0-100.
mm). The secondary outcomes included pain scores at rest and on movement; maternal satisfaction; opioid consumption and side effects measured at 2, 24 and 48 hours post-op.

RESULTS
Patient characteristics were similar in both groups (Table 1). Pain on movement at 24 hours was not significantly different between the two groups. There was a significantly higher pain score at rest and on movement at 2 hours in the placebo group. A sub-group analysis of patients with peritoneal closure showed significantly higher pain scores in the placebo group at 2 hours (at rest and on movement) and at 24 hours (on movement) and lower maternal satisfaction at 2 hours. Patients with self-reported high anxiety scores (NRS ≥ 7/10) showed significantly higher pain scores at 2 hours (at rest and on movement) and lower maternal satisfaction in the placebo group. A higher opiate use was seen in the placebo group, however the number of opiate related side effects was similar in both the groups.

DISCUSSION:
Intraperitoneal instillation of lidocaine during elective cesarean delivery reduces pain scores in the early postoperative period. This analgesic benefit is demonstrated at 24 hours in a sub-set of patients with peritoneal closure. Further studies controlling for peritoneal closure, and using long acting local anesthetics or continuous infusion catheters are warranted.

References:

INTRODUCTION

The practice of obstetrical anesthesia relies on the collaborative efforts between anesthesiologists and nurses. Teamwork remains a challenge in health care and studies continue to demonstrate a disparity between how physicians and nurses perceive collaboration in the workplace. While the reasons for this are varied, it is known that interventions to improve inter-professional collaboration may improve patient care. We sought to identify barriers to collaborative care between anesthesiologists and nurses in a busy Canadian tertiary labour and delivery unit and to validate these findings in other units across Canada and the United States.

METHODS

With institutional ethics committee approval and informed consent of each participant, we conducted this double-blind cross-sectional consensus building study based on the Delphi technique. The study was carried out in two phases. The first phase was completed at our institution. A panel of obstetric anesthesiologists and nurses responded to four parallel sequential rounds of questionnaires. The first round comprised of a set of three open-ended questions: “What are the barriers to collaborative care between anesthesiologists and nurses that affect patient care during the provision of anesthetic care on the labour and delivery unit? What are the reasons they exist? What are some interventions that may address them?” The second round sought consensus on those open-ended questions within the same group of professionals, and items that scored >70% of agreement were used in the third round. The third round (cross-over) sought consensus (>70% agreement) on items gathered by the opposite profession. In the fourth round (ranking), both groups were asked to rank the top ten barriers to collaborative care out of a single list. The second phase of the study was a multicenter validation of the top ten barriers with their associated reasons and interventions. We included 10 tertiary labour and delivery units across Canada and the United States. Program directors for obstetric anesthesia and nursing were consulted seeking consensus on the findings of the first phase (>70% agreement).
RESULTS
For the first phase, we recruited 22 anesthesia providers (10 staff, 5 fellows, 7 residents) and 18 nurses (6 junior, 4 intermediate, 8 senior/leader). The open-ended questions revealed 56 and 30 barriers with corresponding reasons and interventions from the anesthesia and nursing group, respectively. Identified barriers included themes such as professionalism, availability, dissonance, role clarity, team coordination, communication environment, organizational structure and educational gaps. Final results will be presented at the CAS meeting.

References:

3. BMC Nurs 2006 5: 1
4. Medsurg Nurs 2008 17: 35
INTRODUCTION
Most studies comparing Programmed Intermittent Epidural Bolus (PIEB) with Continuous Epidural Infusion regimens have included patient controlled epidural analgesia (PCEA) and/or manual bolus as rescue analgesia for breakthrough pain (1,2). Consequently, the optimal time interval between programmed intermittent boluses is yet to be determined. We designed a study to establish the optimal time interval between programmed intermittent boluses of 10 ml of bupivacaine 0.0625% with fentanyl 2 mcg/mL to produce effective analgesia in 90% of women during first stage of labor without the need of rescue boluses.

METHODS
With institutional ethics committee approval and patients’ informed consent, we conducted a double-blind sequential trial with a biased coin up-down design to obtain the effective interval 90% (EI90) for the PIEB regimen. We included ASA 2-3 nulliparous women at term undergoing spontaneous or induced labor requesting epidural analgesia. An ultrasound-assisted epidural was inserted at L2/3 or L3/4. A test dose of 3 ml of bupivacaine 0.125% plus fentanyl 3.3 mcg/ml was followed by a loading dose of 12 ml of the same solution. PIEB was then started in women whose pain scores achieved VNRS ≤ 1/10 within 20 min after the loading dose. In all subjects the programmed bolus dose was fixed at 10 mL, and the first bolus was delivered 1 hour after the loading dose. The PIEB interval was set at 60 min for the first patient and at varying time intervals (60, 50, 40 and 30 minutes) for the subsequent patients, according to a biased coin design. The primary outcome was effective analgesia, defined as no requirement for a PCEA or a manual bolus for 6 hours after the initiation of the epidural or until the patient was fully
dilated, whichever event occurred first. Pain scores, sensory block levels to ice, degree of motor block and blood pressure were assessed hourly.

RESULTS
We studied 40 women. The calculated EI90 was 42.6 min (95% CI: 38.9 - 46.4) using the Dixon and Mood method and 36.8 min (95% CI: 31.0 - 49.0) using the Isotonic Regression analysis. Peak sensory levels, degree of motor block and incidence of hypotension in each subgroup is presented in table 1.

DISCUSSION
The optimal time interval between programmed intermittent boluses of 10 mL of bupivacaine 0.0625% with fentanyl 2 mcg/mL is approximately 40 minutes. Further studies to determine the efficacy of this regimen throughout the entire duration of labor are warranted.

References:

PAIN: ACUTE-BASIC AND CLINICAL, PAIN: CHRONIC-BASIC AND CLINICAL POSTER DISCUSSION
Sunday, June 26
1:00 PM - 2:45 PM

Moderators:
Dr Collin Clarke, Western University
Dr John Hanlon, University of Toronto

150006 - BRIDGING THE GAP - TAPER SCHEDULE FOR APS DISCHARGE
Presenting Author: Tetyana Postonogova

Primary Author: Zeev Friedman, Mount Sinai Hospital, University of Toronto, Toronto, Ontario

Co-Author(s): Cristian Arzola, Tatyana Postonogova, Archana Malavade, Naveed Siddiqui

151137 - A NOVEL USE OF BETA-BLOCKERS TO REDUCE POSTOPERATIVE PAIN
Primary & Presenting Author: Stephen Yang, McGill University, Montreal, Quebec

Co-Author(s): Juan Gomez-Izquierdo, Gabriele Baldini

151514 - EFFECTS OF MAGNESIUM SULFATE ON THE ENHANCED PAIN SENSITIVITY
Presenting Author: Hyun-Jung Shin, Seoul National University Bundang Hospital, Seongnamsi, South Korea

Co-Author(s): Hyo-Seok Na, Sang-Hwan Do

151813 - INTRATHECAL MORPHINE VS. LOCAL INFILTRATION ANALGESIA FOR TOTAL KNEE AND HIP ARTHROPLASTIES
Primary & Presenting Author: Afra Moazeni Rizi, University of Calgary, Department of Anesthesia, Calgary, Alberta

Primary Author: Linda Hung, University of Calgary, Department of Anesthesia, Calgary, Alberta

Co-Author(s): Andrew Walker, Michael Multan, Sandy Shysh
152793 - MERITS OF WIDESPREAD SINGLE-DOSE DEXAMETHASONE AS PART OF A COMPREHENSIVE PERIOPERATIVE PAIN MANAGEMENT PLAN
Primary Author: Hai Chuan Yu, University of Calgary Cumming School of Medicine, Calgary, Alberta

Co-Author(s): P. Pollak, Geoffrey Hawboldt

152815 - COMPARING KETOROLAC DOSE OF 15 MG VERSUS 30 MG ON POSTOPERATIVE PAIN
Primary & Presenting Author: Andy Lo, Calgary Anesthesiology, Calgary, Alberta

Co-Author(s): Duncan McLuckie, Cecilia De Guzman, Kaylene Duttchen

153053 - RISK FACTORS FOR LONG TERM OPIATE USE AFTER TOTAL KNEE REPLACEMENT

Presenting Author: Nicholas J. Lightfoot, Department of Anaesthesia, Middlemore Hospital, Auckland, New Zealand, Hawkes Bay, New Zealand

Co-Author(s): Sophie Gormack, Julian Dimech, Andrew Cameron

Track: Pain: Chronic - Basic & Clinical

151786 - CHRONIC POST-SURGICAL PAIN AFTER MASTECTOMY: SYSTEMATIC REVIEW
Presenting Author: Hesham Youssef, Western University, London, Ontario

Primary Author: Qutaiba Tawfic, WESTERN UNIVERSITY/ LONDON HEALTH SCIENCE CENTRE, London, Ontario

Co-Author(s): Maria Lopera Velasquez
INTRODUCTION
Following discharge, patients requiring high opioid doses may be at risk for both under and overdosing, posing a major challenge to community physicians. The aim of this study was to examine the effectiveness and degree of satisfaction with a personalized taper schedule and physician letter through interviews of patients and physicians.

METHODS
This was a one year prospective study. Following REB approval and informed written consent, patients admitted for elective surgery, aged 18-60 years old receiving opioid analgesics were recruited. Prior to discharge, the Acute Pain Service team provided patients with a taper schedule explained in detail. Individualized physician letters were faxed to treating family physician. Patients were contacted by phone 2, 4 and 6 weeks after discharge. Physicians were contacted once, a month after discharge. Patients and physicians were asked to grade the taper schedule on a 1-5 Likert scale. Questions pertained to clarity, usefulness for tapering, ability to follow the instructions and general satisfaction.

RESULTS
26 patients and 21 physicians completed the study. Physicians were generally satisfied with both the taper schedule and letter and rated all aspects between 3.76-4.38 out of 5. Similarly patients were satisfied with the taper schedule and rated all aspects between 4.08-4.5.
CONCLUSIONS
Both physicians and patients generally found the taper schedule and letter helpful in assisting them to taper off their opioid use. This is one way of bridging the continuity of care between the acute care providers and community physicians while reducing the risk to patients during the transition period.

References:
INTRODUCTION
Postoperative pain is an important factor that determines the overall quality of recovery after surgery. Beta-blockers have been used as a non-opioid adjuvants to improve postoperative pain. A systematic meta-analysis review was performed to evaluate the effect of intraoperative beta-blockers usage on postoperative outcomes.

METHODS
Three databases (Medline, Embase, and the Cochrane Controlled Trials Register) were searched to identify randomized controlled trials that evaluated the effects of beta-blockers on postoperative pain outcomes compared with a control group. Studies were evaluated based on the Validity and Inter-Rater Reliability Testing of Quality Assessment Instruments in the Cochrane’s Handbook. The aim of the meta-analysis was to assess the postoperative opioid consumption, the postoperative pain score, the incidence of nausea and vomiting, the use of antiemetic medication, the length of hospital stay, and hemodynamic complications.

RESULTS
Five studies were selected. A total of 130 patients received intraoperative esmolol. There was a significant reduction in postoperative opioid consumption in the esmolol group (MD: -8.55 mg; 95% CI -12.31, -4.79 mg). Furthermore, there was also a reduction in the incidence of nausea and vomiting (OR: 0.31; 95% CI 0.18, 0.54), and length of stay in the recovery room (MD: -24.7 minutes; 95% CI -52.6, 3.2 minutes). There was no significant difference in postoperative pain score (MD: -0.49; 95% CI -1.35, 0.37). There was no increase in the incidence of hemodynamic complications.
CONCLUSION
The use of a continuous beta-blocker infusion during surgery decreased postoperative opioid consumption, the incidence of nausea and the length of stay in the recovery room with little side effects.

References:


INTRODUCTION
In staged bilateral total knee arthroplasty (TKA), hyperalgesia could be induced by previous surgical injury [1]. Magnesium attenuates the hyperalgesia due to its antagonistic effect on N-methyl-d-aspartate receptors [2]. We evaluated the effects of magnesium on the enhanced pain sensitivity in patients undergoing staged TKA.

METHODS
Forty-four patients undergoing staged bilateral TKA were enrolled in this study. The magnesium group (n = 22) received magnesium sulfate at 50 mg/kg for 15 minutes followed by 15 mg/kg/h by continuous i.v. infusion until the end of surgery. The control group (n = 22) received the same volume of isotonic saline over the same period. Postoperative pain (numerical rating scale, NRS) at rest, the amount of patient-controlled analgesic (PCA, i.v. fentanyl), and rescue analgesic (i.v. ketoprofen) administered during the 48-hour period after the operation were compared between the two groups and the first and second periods within groups.

RESULTS
NRS scores were greater in the control group at 24 and 48 hours postoperatively in the first TKA (P = 0.001 and P = 0.001, respectively) and in the second TKA (P < 0.001 and P < 0.001, respectively) than in the magnesium group. The amount of rescue analgesics used during the 48-hour postoperative period in the second TKA was greater in the control group than the magnesium group (P = 0.001). Patients received more fentanyl via PCA in the first (P = 0.014) and second (P = 0.001) TKA over 48 hours postoperatively in the control group than the magnesium group. In the control group, at 24 and 48 hours postoperatively, NRS scores (P < 0.001 and P = 0.006, respectively) and the amount of rescue analgesics (P = 0.011 and P = 0.004, respectively) were greater for the second than the first operated knee. The cumulative consumption of PCA during the first 48 hours postoperatively was greater after the second than the first TKA (P < 0.001). In the magnesium group, there were no significant differences in NRS score at postoperative 24 or 48 hours between the first and second operated knee. The amount of rescue analgesics used during 24 hours (P = 0.021) and the cumulative amounts of PCA during first 48 hours (P = 0.004) were greater in the second operated knee.
DISCUSSION
Administration of magnesium significantly reduced postoperative pain and the difference in pain intensity between the first and second operated knee in staged bilateral TKA. This suggests that magnesium has an attenuation effect on hyperalgesia induced by previous surgical injury.

References:

INTRODUCTION
Postoperative pain is significant following total hip (THA) and knee arthroplasty (TKA). Spinal anesthesia is commonly used with the addition of intrathecal (IT) morphine to prolong the analgesic effect. However, this additive may result in adverse effects. Alternatively, the Local Infiltration Analgesia (LIA) technique uses local anesthetics, NSAIDs and epinephrine, injected periarticularly during surgery.¹ The aim of this study was to compare whether IT morphine or LIA provides better analgesia with fewer side effects after total hip or knee arthroplasty.

METHODS
We performed a quality assurance project involving a retrospective chart review of total hip and knee arthroplasties between November 2014 and February 2015 at two different local centres. Exemption from ethics review was obtained from our REB. Each centre used a different pathway for postoperative pain management, either IT or LIA. The IT group received spinal anesthesia with intrathecal morphine and oxycontin CR protocol, whereas the LIA group received spinal anesthesia plus a standardized injection of epinephrine 0.5mg, ketorolac 10.5mg and Ropivacaine 0.2% (200mg), in a total volume of 100mL infiltrated periarticularly plus a modified oxycontin protocol postoperatively. Pain scores at rest, postoperative narcotic requirements, PONV and antiemetic use were recorded across specific time intervals from surgical skin incision (T = 0). Ability to complete physiotherapy and time to discharge were also recorded. Statistical tests were completed using SPSS 19.0.
RESULTS
109 charts were reviewed: 57 patients received IT (28 TKA, 29 THA) and 52 patients received LIA (26 TKA, 26 THA). No consistent difference in pain scores was found for TKA patients, with the exception of higher pain the LIA group at the 24-hour postoperative time-point (LIA =5.39, IT=3.57, p= 0.007). For THA patients, the only significant difference in pain scores was at 6 hours postoperatively (LIA=3.92, IT=2.24, p=0.014). Significantly greater PONV was found in the TKA-IT group compared to TKA-LIA between 0-16 hours (64% vs. 31%, p= 0.012), and more antiemetic use was noted in TKA-IT. In both surgical groups, there was no significant difference in ability to complete physiotherapy or hospital length of stay when comparing IT or LIA.

CONCLUSION
Pain scores were similar between LIA and IT groups at all time points (0-96h), except higher scores in the LIA group at 6 hours (THA) and at 24 hours (TKA) postoperatively. Increased PONV in the IT group may be the result of IT morphine or higher doses of oxycontin CR used at this centre. Although not statistically significant, increased PONV in the IT group was associated with decreased attendance of physiotherapy on postoperative day 1 for TKA patients. LIA appears to yield largely similar pain control to IT, but results in less PONV.

References:

INTRODUCTION
Dexamethasone is used perioperatively for the prevention of postoperative nausea and vomiting (PONV). Systemic perioperative dexamethasone has been found to reduce postoperative pain and opioid consumption. Given the concerns surrounding the perioperative use of NSAIDs as an analgesic, dexamethasone may be used to provide analgesia without the side effects associated with NSAIDs. This review provides a detailed account the benefits of perioperative dexamethasone, its merits as an analgesic agent, and potential side effects associated with perioperative single-dose dexamethasone administration.

METHODS
Pubmed and Medline searches were conducted for peer-reviewed articles surrounding the analgesic properties of perioperative single-dose dexamethasone. Moreover, separate searches were conducted for articles discussing potential side effects of perioperative dexamethasone use. Articles were not excluded based on time of publication, type of article, or patient population.

RESULTS
Perioperative single-dose dexamethasone administration is an effective antiemetic, and is most commonly administered for this indication. Moreover, dexamethasone has also been shown to reduce hospital length of stay and reduce the incidence of sore throat after endotracheal intubation.

Single-dose IV dexamethasone at 8-10mg has been shown in numerous studies to significantly reduce the severity of pain both at rest and with movement from as early as 1 hour post-op. Dexamethasone administration also resulted in significantly less consumption of both opioids and other analgesics, and delayed the request for post-op analgesia.

Current literature depicts a favourable safety profile for perioperative single-dose dexamethasone. No significant differences in outcomes could be found with respect to postoperative infection rates and delayed wound healing. Perioperative hyperglycemia as well as perineal irritation have been documented, although both can be managed without adverse outcomes.
DISCUSSION
Current literature suggests that dexamethasone at doses similar to those used for PONV prophylaxis provides a significant analgesic effect. This helps to reduce both early and late postoperative pain at rest and with movement, while decreasing opioid demand and delaying patients' demand for analgesics. Perioperative dexamethasone administration also has the added benefit of reducing both length of postoperative hospital stay, as well as helping to alleviate sore throat commonly experienced after endotracheal intubation. Therefore, perioperative dexamethasone should be considered not only for its antiemetic properties, but for use as a co-analgesic agent as part of a balanced multimodal anesthetic.

Overall, evidence in current literature depicts a favourable safety profile of perioperative dexamethasone. In addition, strong evidence demonstrating its efficacy in reducing PONV and postoperative pain suggests that its routine use would benefit most patients in the perioperative setting.

References:
N/A
INTRODUCTION
Ketorolac has been supported in medical literature and clinical practice for the treatment of postoperative pain. The standard parenteral dose recommended by manufacturer for healthy non-elderly population is 30 mg based on a number of clinical trials. The smallest effective dose is ideal to avoid side effects. In our randomized controlled trial we hypothesize 15 mg single-shot intraoperative dose to be non-inferior to the standard 30 mg dose in VAS (Visual Analogue Scale) pain score 4 hours after adult decompression spine surgery.

METHODS
Ethics approval was granted for this study by the local ethics board. Informed consent was obtained for each participant. Fifty patients scheduled for spine surgery were recruited and randomized to two groups. They received a single dose of either 30 mg or 15 mg of ketorolac at the end of surgery. Nursing staff were instructed to record VAS pain scores 4 hours after administration, and NRS (Numerical Rating Scale) pain scores 4, 8, 12, and 24 hours after administration. The medication was prepared by the hospital pharmacy with the dose blinded to the patient, anesthesiologist, and nursing staff. The a priori set non-inferiority margin was 6 mm on the VAS. All statistical tests were performed in SPSS 19.0. Non-normally distributed data are presented as median (interquartile range). Differences between groups were assessed using the Mann-Whitney U test and Fisher’s exact test.

RESULTS
Mean ages were 54 (22.5) and 53 (16.6) (p = 0.42) in the 30 mg and 15 mg groups, respectively. Gender proportions were equivalent in each group (17M:8F). Four-hour VAS scores of 25 mm (26.5 mm) and 35 mm (27.5 mm) in the 30 mg and 15 mg groups respectively, were not significant (p = 0.189). Absolute difference in 4-hour VAS scores between the two groups was 7.9 mm (95% CI, -1.5 mm – 17.4 mm) (Figure 1). Although consistently higher in the 15 mg group, no statistically significant differences were noted in 4-hour (p = 0.12), 8-hour (p = 0.38), 12-hour (p = 0.06) or 24-hour (p = 0.16) NRS pain scores.
CONCLUSIONS
In this study, 15 mg versus the standard dose of 30 mg failed to demonstrate non-inferiority based upon our a priori margin of 6 mm VAS. Further study regarding the optimum dose of perioperative parenteral ketorolac is warranted.

References:

3. Anesthesiology 1994 80: 1277–1286
INTRODUCTION
Total knee arthroplasty (TKA) can be associated with moderate to severe post-surgical pain. During the initial perioperative period this can generally be managed with a multimodal analgesic strategy, including the use of opiate based agents. [1]

With time most patients are able transition to simple oral analgesia however a percentage of patients develop a state of persistent or chronic post-surgical pain where the use of oral opiates may be considered. [2]

Although pain needs to be treated, long term use of opiate agents is not without complication or risk. With a move towards new pathways of TKA care in our institution we have performed a review to determine the incidence and risk factors for long term opiate use.

METHODS
Hospital Research Board approval was obtained prior to study conduct. Patients admitted for primary unilateral TKA between 1st January 2014 – 31st December 2014 were retrospectively enrolled. Demographic, anaesthetic, surgical and pharmacy data were collated from pre-existing departmental databases.

The primary endpoint was the need for an opiate prescription (either morphine or oxycodone) between 7 and 90 days’ post-surgery.

Factors associated with the primary end point were determined through univariate then multivariate modelling. Analysis was completed with Deducer for R, Version 2.15.0 with a threshold for significance of 0.05 on two tailed testing.

RESULTS
Three hundred and thirty-six patients underwent primary unilateral TKA during the study period. There were 135 males and 201 females. The median age (± interquartile range) was 67 (± 13) years. Pharmacy data was unavailable for 100 patients who were excluded from subsequent analysis.
Between day 7 and 90 post surgery 65 patients (65 / 236 = 27.5%) required an opiate prescription. The predictors for a patient requiring an opiate prescription and the results of multi-variate modelling are shown in Figure One.

Factors associated with the primary outcome in the final version of the model were length of hospital stay (p=0.003), pre-operative use of morphine or oxycodone preparations (p=0.003), post-operative paracetamol (p

CONCLUSION
These results confirm that a significant percentage of patients require prescriptions for opiate medications in the first 3 months after surgery. The factors associated in this series point to a group who experience greater levels of both pre and post-operative pain and may have longer or more complex hospital stays.

Future work in this area should focus on strategies which optimise peri-operative care such that patient satisfaction and outcomes can be maximised. This may include the use of multi-disciplinary pathways which may allow earlier recognition of complications or abnormal pain states.

References:
INTRODUCTION
Chronic Post-surgical pain (CPSP) is considered one of the inevitable surgical complications despite all the advances in surgical techniques and the development of new modalities of pain management. CPSP can be defined as a persistent pain for a minimum of two months after a surgical procedure. The reported prevalence of CPSP after mastectomy ranges from 20% to 56%. Neuropathic pain has a crucial role in the CPSP associated with mastectomy. This systematic review focuses on the evidence for perioperative interventions to reduce the incidence of this problem.

MATERIALS AND METHODS
A literature search was carried out using Medline, Embase and the Cochrane Library for articles for the relevant keywords (mastectomy, breast surgery, chronic post surgical pain, persistent pain after surgery, paravertebral block, regional anesthesia in breast surgery). Additional studies were identified by manually tracking references from published papers. All subject headings were examined for relevant terms that are related to mastectomy. Articles were limited to randomized controlled trials (RCTs) in adult human patients. Studies were assessed for high risk of bias by the Cochrane Risk of Bias Tool. We did not perform a meta-analysis due to the limited number of the studies on each therapeutic mode and also, because most studies' results were in the same direction.

RESULTS
The initial literature search resulted in approximately 600 citations. After we had removed all duplicates, irrelevant and ineligible articles, fourteen Randomized Controlled Trials were met the inclusion criteria. Intravenous lidocaine infusion during surgery reduced the incidence of CPSP after mastectomy (2 RCTs)\(^1,2\). Paravertebral block before mastectomy reduced the incidence of CPSP (2RCTs). Venlafaxine reduced CPSP after mastectomy (1 RCT)\(^3,4\). Application of EMLA (Eutectic mixture of local anesthetics) cream reduced CPSP after mastectomy (1 RCT)\(^5\). Studies on ketamine, gabapentin, mexiletine, amantadine, nonsteroidal anti-inflammatory drugs, and local anesthetic infiltration failed to provide enough evidences about the reduction
in CPSP after mastectomy.

**DISCUSSION**
Post-surgical pain may persist for months after the surgical procedure and becoming what is called CPSP. Chronic pain represents a serious physical and mental healthcare problem affecting the patient and the community in general. Studies showed that regional anesthesia (paravertebral block) is an effective intervention to reduce CPSP after mastectomy. Among the pharmacological agents, intravenous lidocaine infusion, and to some extent venlafaxine, are the only agents have shown to reduce CPSP after mastectomy. Well-designed clinical trials are required to identify the role of the current pain pharmacological agents in preventing and treating CPSP.

**References:**
2. Pain Physician 2015;18:E139-46
4. Anesth Analg 2006; 103: 703–8
PATIENT SAFETY POSTER DISCUSSION
Sunday, June 26
1:00 PM - 2:45 PM

Moderator: Claude Laflamme, Sunnybrook HSC, Toronto, Toronto, Ontario
Moderator: Daniel Chartrand, McGill University, Montreal, Quebec

146677 - SEDATION FOR OUTPATIENT ENDOSCOPY: A QUALITY ASSURANCE AUDIT
Primary & Presenting Author: Steven Backman, McGill University, Montreal, Quebec
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147508 - RISK FACTORS FOR POSTOPERATIVE HYPOXEMIA IN CURRENT ERA
Primary & Presenting Author: Puneet Goyal, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, UP, India, Lucknow, India
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151019 - ULTRASOUND USE FOR CENTRAL VENOUS CATHETER PLACEMENT
Primary & Presenting Author: Nicholas Dennison, St Pauls Hospital/ British Army, Vancouver, British Columbia
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152817 - OPTIMAL THERAPY OF PREOPERATIVE ANEMIA: PRELIMINARY COHORT RESULTS
Presenting Author: Garrett S. Barry, Department of Anesthesiology and Perioperative Medicine, Vancouver General Hospital, Vancouver, British Columbia
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152928 - EFFECT OF ACTIVE PREOPERATIVE WARMING ON INTRAOPERATIVE HYPOTHERMIA
Primary & Presenting Author: Aaron Lau, University of British Columbia, Vancouver, British Columbia
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152933 - SYSTEM ERRORS FOUND IN RURAL HOSPITALS USING IN-SITU SIMULATION
Primary & Presenting Author: Katie Carten, Memorial University of Newfoundland, St. John's, Newfoundland and Labrador
Co-Author(s): Jeffrey Ng, Stephanie Power-MacDonald, Noel O'Regan, Sonia Sampson

153121 - IMPACT OF SURGICAL SPECIAL CARE UNITS: A SYSTEMATIC REVIEW
Presenting Author: Nicholas Mendis, University of Ottawa, Ottawa, Ontario
Co-Author(s): Gavin Hamilton, Daniel McIsaac, Dean Fergusson, Hannah Wunsch, Daniel Dubois, Homer Yang, Colin McCartney, Lauralyn McIntyre, Michaël Chassé, Heather McDonald, Alexis Turgeon, Sonia Sampson, André Denault, Manoj Lalu

153208 - A CROSS SECTIONAL COMPARISON OF OR HAT BACTERIA
Presenting Author: Brent Francis, University of Saskatchewan, Saskatoon, Saskatchewan
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INTRODUCTION
Outpatient endoscopy presents the challenge of safe analgesia and sedation with seamless recovery. This can be formidable in a high-volume practice with limited resources. We assessed the sedation and analgesia regimen (midazolam & fentanyl; gastroenterologist-supervised, nurse- administered) used during endoscopy at our institution.

METHODS
This is a single-sited, prospective observational study on patients scheduled for elective endoscopy (15 June -15 August 2015). This quality assurance audit received approval from our local REB. Main outcome measures were midazolam & fentanyl doses and patient satisfaction (pain, nausea and drowsiness) during & after the procedure (10 point VAS). Gastroenterologists and nurses also scored patients on their perceived comfort during endoscopy (10 point VAS). Other outcomes included supplemental O₂ use, lowest O₂ saturation during & after procedure, time for PACU discharge readiness, and impaired mobility upon discharge. Multiple regression analysis tested possible associations.

RESULTS
436 patients [198 M/238 F, 57±16 years (mean±SD); BMI 27±7 kg/m²] were studied (263 colonoscopy, 148 gastroscopy, 25 combined). The midazolam and fentanyl doses were 2.8±1.2 mg [median 2; IQR 2.4: range (min-max) 0-8 mg] and 72±29 µg [median 75; IQR 50, 100: range 0-200 µg], respectively. During the procedure, patient’s pain VAS’s were higher (2.4±2.2) than those estimated by the gastroenterologists (1.9±1.4) and nurses (2.0±1.4). Baseline O₂ saturation (room air) was 97.8±1.8 % and the minimum O₂ saturation during the procedure was 92.6±4.5 % [range 70-100 %; supplemental O₂ used 13.5%]. Pain, nausea, and drowsiness scores in the PACU were 1.3±1.0, 1.2±0.8, and 2.6±2.1, respectively. PACU baseline O₂ saturation (room air) was 96.2±2.2 % and the minimum O₂ saturation was 95.0±2.4 % [range 88-100 %;
supplemental O₂ used 3%. The average time for PACU discharge readiness was 53±23 minutes [median 50; IQR 40, 60: range 10-185 minutes]. While most patients were able to ambulate (n=350, 80.3%) a wheelchair was occasionally required (n=62, 14.2%). Age, BMI and fentanyl dose were associated with lower O₂ saturation both during and following the procedure (Table). Discharge ready time was related to fentanyl dose and patient’s drowsiness score (Table). The drowsiness score was in turn related to midazolam dose (Table).

DISCUSSION
Oxygen should routinely be administered during endoscopy. While nurses and endoscopists estimated lower patient pain scores than did the patients, an adequate level of analgesia was achieved. In the PACU, patients did not experience worrisome desaturation and the pain and nausea scores were surprisingly low. Drowsiness scores were higher and related to midazolam dose. Time for patient readiness discharge was related to patient drowsiness scores and fentanyl dose. Possibly, recovery could be improved by selectively reducing midazolam & fentanyl doses.

References:
Not Appliable
INTRODUCTION
Morbidities associated with hypoxemia necessitate routine administration of oxygen in immediate postoperative period. Hypoxemia can occur even with oxygen administration; on other hand oxygen might not be needed in about two thirds of patients in PACU. Identification of various risk factors responsible for development of postoperative hypoxemia can help in improving patient safety and reducing cost by judicious use of O2 therapy.

MATERIAL AND METHODS
After approval from institute’s ethics committee and written informed consent patients with age of 18-65 yrs and either sex undergoing abdominal surgery, requiring general anaesthesia with endotracheal intubation were included. Patients requiring emergency surgery, minor procedures, patients with preoperative cardiac disease and those shifted to PACU on ventilatory support were excluded. 490 patients were enrolled, 38 patients were shifted to PACU without extubation, hence excluded from analysis. Oxygen saturation was recorded before induction in operating room (Baseline SPO2), following extubation on room air, after arrival in PACU, and continuously there after till discharge from PACU and at every 8 hours after that till 72 hours post-surgery. Patients were maintained on room air if SpO2 remained > 94%, If SpO2 decreased below 94%, oxygen therapy was provided via face mask. If SpO2 was 85-89% despite oxygen therapy with face mask, Bi-level positive airway pressure mask was applied. If SPO2 persisted below 90% on BiPAP then ventilatory support was provided after endotracheal intubation. Correlation of postoperative hypoxemia (or need for postoperative oxygen
therapy) with various factors like age, sex, BMI, coexisting respiratory diseases, smoking status and duration of surgery/anesthesia was performed.

RESULTS
61 patients developed SpO$_2$ $\leq$94% requiring oxygen therapy (13.5%). 51 patients required oxygen therapy by face mask, 8 by BiPAP and 2 required ventilatory support with endotracheal intubation. 60 patients needed it in first 2 hrs after extubation. Age, BMI, Smoking status, presence of preoperative respiratory disease, SpO$_2$ (on room air) at baseline and SpO$_2$ (on room air) immediately after shifting to PACU were independently associated with requirement of postoperative oxygen therapy (Binary logistic regression analysis).

To identify the most significant subgroup for a particular risk factor which might have highest association with development of postoperative hypoxemia, Test of two proportions (Z test) was performed (Table 1)

DISCUSSION
Risk of postoperative hypoxemia and need for oxygen therapy is highest in following subgroups of patients; Age group of 51-65 years, BMI more than 30, Current as well as former smokers, pre-existing respiratory disease esp. COPD, patients with 96% oxygen saturation or less at baseline or after shifting to PACU. Site of incison, duration of surgery, dose and type of opioid administered did not have significant association with postoperative hypoxemia.

References:
INTRODUCTION
UK’s National Institute for Clinical Excellence (NICE) published a guideline in 2002 recommending the use of 2-D ultrasound imaging during the insertion of elective Central Venous Catheters (CVC)\(^1\).

Compliance with this guideline was reviewed in 2012. 54% of CVC insertions were performed using ultrasound imaging and the complication rate was 8.5%. As a consequence more ultrasound equipment was purchased in 2013 and a teaching course for trainees was introduced in 2014.

This study re-examines the compliance with the 2002 NICE guideline and seeks to determine if the new equipment and training has made an impact on patient safety.

METHODS
A prospective audit of CVC insertion was performed after local ethics committee approval. Anaesthetic consultants and trainees were asked to complete a questionnaire following CVC insertion. The data was then collected and analysed on a spreadsheet. Categorical data was tested for significance using Chi-Squared (compliance) and Fisher’s Exact Test (complications).

RESULTS
160 CVCs were inserted mainly in the cardiac operating rooms. All CVCs were placed in the internal jugular vein using aseptic technique. 91.3% (146/60)were elective cases the remainder in emergency.

Ultrasound use has increased significantly from 50% (61/122) in 2012 to 84% (122/46) in 2015 (P

Ultrasound was not used in 14% (23 cases) due to ‘operator preference’, 2% (3 cases) due to equipment non-availability.
There was no overall difference in the complication rate of 8.5% in 2012 and 8.1% in 2015 (14/163 vs 13/160). Subgroup analysis revealed a decrease in arterial puncture rate (6.7% in 2012 to 1.3% in 2015)(11/163 vs 2/160).

The two arterial punctures that occurred both occurred with ultrasound use: one noted by a trainee, the other by a consultant.

**DISCUSSION**

The use of ultrasound has significantly increased for elective cases from 54% in 2012 to 84% in 2015 for elective cases. ‘Operator Preference’ remains the most commonly cited reason for landmark CVC technique.

Ultrasound guided CVC insertion 24/2009 (1.6%) has been demonstrated in a large meta-analysis to have a significantly lower arterial puncture rate than landmark guided technique 196/2018 (9.7%)\(^2\). Our ultrasound placement results are similar these rates. Arterial puncture remains the most serious of complications of CVC insertion if unrecognised and it is import to deliver this intervention in the safest possible manner. Operators maintaining their landmark technique can improve success and safety by considering the use if a pre-scan/ surface marking technique. It is the authors' recommendation that if clinicians wish to maintain their landmark-guided CVC placement skills and ultrasound is available, then the prescan technique is appropriate\(^3\).

**References:**

1. NICE guideline Sept 2002 [https://www.nice.org.uk/guidance/ta49](https://www.nice.org.uk/guidance/ta49)
INTRODUCTION
Preoperative anemia is common and predicts worse surgical outcome (1). Perioperative allogeneic blood transfusion (ABT) increases proportionally with decreasing serum hemoglobin (hgb) concentration, and has been shown to increase the incidence of postoperative complication rates (2,3). While iron supplementation and erythropoietin are effective perioperative blood management (PBM) strategies, the optimal duration and dosing of treatment to reduce transfusion requirements remain unclear. The aim of this retrospective, single-centre cohort study is to identify the most effective PBM regimen to increase patient hgb and reduce transfusion requirements in anemic patients. Here we report a proof-of-concept for our ongoing large-scale analysis.

METHODS
Local hospital research ethics board approval was obtained. Patients undergoing medium to high risk surgery with preoperative hgb ≤125g/L were referred to our hospital PBM program between January 2011 to October 2013. The following data were collected via retrospective chart review: demographic information; surgery performed; preoperative hgb; treatment type (oral ferrous fumarate, IV iron sucrose, erythropoietin), doses, and dates. Patients who received ABT between date of referral and surgery were excluded, as were patients with bleeding diatheses, diagnosed thalassemia, or who refused transfusion of blood products. Change in hgb from date of referral to date of surgery and rate of ABT was compared via multivariate regression analysis within treatment groups, controlling for patient demographics and initial hgb and ferritin concentrations. Data analysis was performed in R statistical environment.

RESULTS
One hundred and ninety-five preoperatively anemic patients met all inclusion criteria for this preliminary analysis. Only nine patients received erythropoietin and were therefore excluded. Duration of oral iron (ferrous fumarate, ≥300 mg daily) monotherapy for >30 days does not yet show an increased effect on patient hgb or rate of ABT (Figure 1A; P = 0.09). Multiple intravenous iron doses were not found to have any improved benefit over a single dose (Figure 1B; P > 0.05). However, patients ending therapy greater than
30 days prior to surgery showed significantly improved preoperative hgb above those ending treatment within 30 days of surgery. This finding was independent of the number of doses received (P = 0.047 and 0.023, for treatment ending 30-59 and >60 days prior to surgery, respectively). The sample size of patients receiving ABT is presently not adequate to demonstrate the effects of oral or intravenous iron on ABT rate (Figure 1 C and D).

CONCLUSION
This ongoing single-centre retrospective cohort study is proposed as a proof-of-concept to determine the optimal treatment to increase hgb and reduce the rate of ABT in preoperatively anemic patients. Our large data set includes more than 12 000 patients and should provide valuable insight into optimal management of preoperative anemia. Updated analyses will include erythropoietin-treated patients and comparisons between treatment groups.

References:

1. The Lancet 2011 378: 1396-1407
INTRODUCTION
Intraoperative hypothermia, with a core body temperature < 36°C [1], is associated with adverse outcomes [1-3], including surgical site infections, coagulopathy, and patient discomfort. Despite effective intraoperative warming techniques, reduction in core temperature inevitable occurs due to peripheral redistribution of body heat [4]. Preoperative forced air warming has been shown to reduce the percentage of the case spent hypothermic in children undergoing spine surgery [5]. However, forced air warming core temperature patterns remain poorly characterized in adults [6]. The aim of this study was to evaluate the effects and patterns of preoperative forced air warming in major adult surgeries.

METHODS
After approval by the local research ethics board, a prospective, randomized study was performed. After written informed consent, adult patients undergoing elective surgery, with scheduled duration over 1 hr, were randomized into two groups: standard passive warming via flannel blankets on patient request or active prewarming via BairPaws gown (3M Canada) starting at least 30 minutes before entering the operating room. Both groups received intraoperative forced air warming. Perioperative temperature was collected using the SpotOn core temperature system (3M Canada). Intraoperative vital signs were continuously recorded using S/5 Collect (GE Healthcare Canada). Outcome data, including 30-day surgical site infection rates using NSQIP criteria, number of transfusions of red blood cells, and administration of opioids in the post-anesthetic care unit, were recorded manually using case report forms. Data were analyzed using MATLAB (The Mathworks Inc), using the Wilcoxon rank-sum test for intraoperative hypothermia data and Fisher’s exact test for outcome data.

RESULTS
Preliminary data from 200 patients (102 males), with median [range] age 60 [20-85] years, with BMI 27.2 [17.5-56.3], were available. Prewarming reduced intraoperative hypothermia, as measured by the area under the 36°C temperature curve by 0.65°C*min (95%CI 0.01-2.20°C*min, p=0.004). Hypothermia was less prevalent in the prewarmed group (37% vs. 53%, p=0.023), and case-end temperatures were 0.3°C higher as well (95%CI 0.19-0.50°C, p
CONCLUSION
Preoperative forced air warming reduces the magnitude of redistribution hypothermia. This study demonstrates that preoperative forced air warming is associated with a significant reduction in frequency of intraoperative hypothermia and duration of hypothermic exposure.

References:
INTRODUCTION
The primary objective of our study was to use in situ simulation to identify latent system errors associated with high risk, low frequency pediatric anesthetic events in operating rooms (OR) of rural hospitals. The secondary objective was to expose simulation-naïve perioperative personnel to simulation education.

METHODS
Ethics approval was obtained by the Health Research Ethics Board (HREB) and from each respective health region visited. Perioperative personnel from 3 rural hospitals consented to participate in 2 simulated scenarios. Each in-situ visit consisted of a 20 minute briefing, a 20 minute simulated scenario (video recorded), followed by a 40 minute debriefing session with a didactic teaching component. The 2 rare pediatric anesthetic events were malignant hyperthermia (MH) and local anesthetic systemic toxicity (LAST). A qualified member of the research team acted as the embedded simulated anesthesiologist who responded to each event as per predetermined management checklists. These checklists of anticipated latent errors essential for management of these crises were constructed from provincial expert opinion using the Delphi technique. Three anesthesiologists from an urban site with experience in simulation-based medical education determined anticipated latent errors using the Delphi checklists and video footage. Unanticipated latent errors were identified using debriefing notes and video footage. Feedback forms completed by the participants were used to assess the learning experience.

RESULTS
Latent system errors are categorized as medication-related, equipment-related, or policy/protocol-related errors. Latent errors identified from the checklist include the lack of a LAST protocol on the OR crash cart, lipid emulsion not being readily available in the OR, and a delay in arterial blood gas results. Example of unanticipated errors include ICU staff not having card access to the OR when responding to intra-operative code and the use of individual 10cc vials of sterile water to reconstitute dantrolene. Results were communicated with each site via summary documents containing recommendations for resolution of latent system errors. This lead to a change in policy at each site. Participants rated the sessions very positively based on the feedback
forms and most requested that at least 3 simulation sessions per year would be desired at their respective sites.

**DISCUSSION**
In-situ simulation was a useful method to identify and resolve latent system errors (both anticipated and unanticipated) in ORs in rural hospitals. Feedback on latent errors may improve patient safety and may potentially decrease morbidity and mortality within these clinical environments. This study also provided a meaningful learning experience to simulation naïve participants around rare emergency anesthetic events.

**References:**

Qual Saf Health Care 2010 Oct;19 Suppl 3:i53-6
Qual Saf Health Care 2010 Oct;19 Suppl 3:i53-6
INTRODUCTION
Perioperative intermediate care units (termed surgical special care unit, or SSCU) may improve surveillance of at-risk surgical patients. Institution of an SSCU may lead to global improvements across patient outcomes, as well as reduce the workload and financial burden at a systems level. Accordingly, we conducted a systematic review in order to investigate the effect of a 3-level model of care delivery (i.e. ward, SSCU, ICU) compared to a 2-level model of care (i.e. ward, ICU) on post-operative mortality, morbidity, and healthcare resource utilization.

METHODS
The protocol for this systematic review was registered with PROSPERO (CRD 20154025155). Randomized controlled trials (RCTs) and non-randomized comparator studies (NRCTs) that compared a three vs two level model of care of perioperative non-cardiac surgery patients were included. A systematic search of Medline, CINAHL, Embase, and the Cochrane library was performed (inception-01/2015). Retrieved citations were screened and data extracted independently in duplicate. Data were extracted for mortality (primary outcome) as well as serious adverse events (SAEs), length of stay, and hospital costs (secondary outcomes). We planned pooling data (relative risk) using random effect models with the DerSimonian and Laird method, if applicable.
RESULTS
1868 citations were retrieved by our search and 21 studies met eligibility criteria (2 RCTs, 19 NRCTs, 44134 patients). SSCUs were variably characterized by continuous monitoring (11 studies), absence of mechanical ventilation (7 studies), nursing:patient ratios (range 1:2-1:4), and number of beds (5, 3-33; median, range). Thirteen studies reported on mortality, three of which reported overall in-hospital mortality in a 2 vs. 3-level model of care. Significant methodological heterogeneity precluded pooled analysis, however two of the three studies demonstrated no difference in overall hospital mortality, and one demonstrated an increased mortality in a 3-level model of care vs 2-level model. Four studies reported ICU-specific mortality, two of which demonstrated an increased ICU mortality in a 3-level model of care. Four studies compared total in-hospital costs, two of which demonstrated reductions with a 3-level model of care. Nine studies reported on hospital length of stay and demonstrated no significant difference. Four studies reported SAE data, however heterogeneity in reporting precluded meaningful analysis.

DISCUSSION
In this first systematic review of SSCUs, we observed significant heterogeneity in SSCU design and reporting of outcomes. Available data may suggest a 3-level model of care may increase in-ICU mortality with no difference in overall in-hospital mortality. This may reflect a 'decanting' of lower acuity patients from the ICU to the SSCU in a 3-level model of care. The potential effects of a 3-level model of care on hospitalization costs warrants further investigation.

References:
N/A
A CROSS SECTIONAL COMPARISON OF OR HAT BACTERIA

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INTRODUCTION
Surgical site infections (SSIs) occur in 2 - 5% of patients, increase length of stay by 9.7 days and increase patient morbidity and mortality (1). Most pathogens are from patients own skin flora, mucous membranes or hollow viscera (1). Additionally patient’s age, diabetes, smoking, obesity, nutritional status, length of preoperative hospitalization, hypothermia, immunosuppression and concomitant infection increase SSI rates (2). Sterile gloves and surgical technique, proper ventilation, and antibiotic prophylaxis are preventative. (2). OR attire outside the sterile field has not been shown to affect SSIs, however outbreaks from scalp organisms while wearing disposable hats are described (2). Home laundering of scrubs is equivalent to hospital laundering when ironed or dried with heat. (3). Our local policy requires paper hats.

METHODS
We conducted a convenience sample of OR staff to compare bacterial counts on paper vs. cloth OR hats. Nine unopened boxes of paper hats were also sampled. Local REB approval was obtained. Following informed consent we sampled OR staff between noon and 16:00. In addition to demographic data, laundering habits were collected for cloth hats. Using a swab moistened with TSP broth each hat was sampled at the same external location. The swab was incubated overnight in TSP broth. Day 2, broth turbidity was measured using a Genesys™ 10S Vis Spectrophotometer (Thermo Fisher Scientific). Undiluted samples were plated on selective MacConkey and Denim-blue plates for Gram-negative and MRSA respectfully. Turbidity guided dilution for non-selective Sheep blood plating. After incubating overnight, plates were scored and photographed. Questionable plates were gram stained to identify MRSA.

RESULTS
There were 64 paper and 41 cloths hats included, 36 of 41 were personally owned / laundered and 5 owned by a private surgical facility. None of the hats grew MRSA. Turbidity of cloth hats were higher than paper (P = 0.003). Paper had less colony forming units than cloth on non-selective sheep blood agar (P=0.014). There was no statistical difference in gram-negative culture growth between paper & cloth. (P = 0.150). Cloth worn more than once without washing had higher turbidity than all hats worn only once (p=0.045). Hats worn more than once did not have more colony forming units on sheep blood agar (p=0.101). Eight of nine new boxes of paper hats had positive
growth on sheep blood agar, 75% had CFU’s too numerous to count. Two of the eight boxes had turbidity among the highest in the study but none grew gram negative or MRSA bacteria.

**DISCUSSION**
Cloth hats grew more bacteria on non-specific media but did not grow more pathogenic bacteria than disposable hats. No hats grew MRSA and new boxes of disposable hats had higher than expected bacteria counts. Cloth hats should be washed / dried after each use.

**References:**

138022 - PERI-OPERATIVE STEROID SUPPLEMENTATION FOR ADRENAL INSUFFICIENCY
Presenting Author: Kristine Urmson
Primary Author: Hardave S. Gill, University of Saskatchewan, Saskatoon, Saskatchewan
Co-Author(s): Kristine Urmson

143085 - FACTORS PREDICTING IMPACT OF PEDIATRIC ANESTHESIA CASE REPORTS
Presenting Author: Maria Salman, National University of Ireland, Galway, Ireland
Primary Author: Clyde Matava, Hospital for Sick Children, University of Toronto, Toronto, Ontario
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145876 - DEXMEDETOMIDINE USE AFTER PAEDIATRIC CARDIAC CATHETER PROCEDURES
Primary & Presenting Author: James T. Gaynor, British Columbia Childrens hospital, Vancouver, British Columbia
Co-Author(s): Nick West, Chris Chin

149282 - CAN CHILD LIFE PREPARATION REDUCE PREOPERATIVE ANXIETY?
Presenting Author: Nancy A. Christopher, Anesthesiology, Pharmacology, and Therapeutics, University of British Columbia (UBC), Vancouver, British Columbia
Co-Author(s): Nicholas West, Kirsten Farquharson, Myles Cassidy, Karen Campell, Trish Page, Zoë Brown
151371 - SUBTENON BLOCK IN PEDIATRIC STRABISMUS SURGERY: A META-ANALYSIS
Presenting Author: Ushma Shah, The Hospital For Sick Children, Toronto, Ontario
Primary Author: Carolyne Pehora, The Hospital For Sick Children, Toronto, Ontario
Co-Author(s): Bradley Johnston, Mark Crawford, Carolyne Pehora, Bradley Johnston, Mark Crawford

151903 - KINDERGARTEN ASSESSMENT IN CHILDREN ANESTHETIZED BEFORE AGE 4
Primary & Presenting Author: M Ruth. Graham, University of Manitoba, Winnipeg, Manitoba
Co-Author(s): Marni Brownell, Daniel Chateau, Randall Fransoo, Marni Brownell, Daniel Chateau, Randall Fransoo

152286 - A NOVEL INTERVENTION FOR REDUCING PERIOPERATIVE ANXIETY
Primary & Presenting Author: Cheryl Chow, MiNDS Neuroscience Graduate Program, McMaster University, Richmond Hill, Ontario
Co-Author(s): Louis Schmidt, Ryan Van Lieshout, Nadine Nejati, Stephanie Wan, Eliza Pope, Mark Hwang, Debbie O'Rouke, Luis Michelangeli, Ali Shahzada, Amanda Whippey, Desigen Reddy, Norman Buckley

153037 - OVERNIGHT OXIMETRY AT HOME BEFORE AND AFTER ADENOTONSILLECTOMY
Presenting Author: Elizabeth Allison, University of British Columbia, Department of Anesthesiology, Pharmacology and Therapeutics, Vancouver, British Columbia
Co-Author(s): Ainara Garde, Aryannah Umedaly, Dustin Dunsmuir, Neil Chadha, Mark Ansermino
Adrenal insufficiency is a disorder of the adrenal glands where they do not produce enough of certain hormones, mainly cortisol and aldosterone. Management of patients with adrenal insufficiency presenting for surgery in regards to steroid supplementation remains unclear. Congenital adrenal hyperplasia (CAH), one form of adrenal insufficiency, is a disorder involving a deficiency of an enzyme involved in the synthesis of cortisol, aldosterone, or both. Current guidelines are clear that high dose steroids are recommended for children with CAH undergoing anesthesia. High dose steroids have potential risks such as bradycardia, hypotension and asystole, increased risk of infection, blood glucose disorders, liver & gastrointestinal effects, and psychiatric syndromes. Given the risks identified, it is important to examine if current recommendations reflect clinical practice in providing optimal care for patients.

METHODS
Local research ethics board approval was obtained prior to study commencement. A cross-sectional survey was distributed following pretesting and pilot-testing. Invitation to participate in the survey was distributed via the Canadian Pediatric Anesthesia Society members’ email list. The initial email invitation was followed with two additional invitations to complete the survey. Responses were analyzed using standard tabulations.

RESULTS
55% of respondents would not provide stress-dose steroids for a cystoscopy and 21% would not do so for a laparotomy, despite the Endocrine Society Clinical Guidelines on CAH. See Table 1.

DISCUSSION
Our results demonstrate variation in clinical anesthetic practice regarding stress dose steroids in children with CAH undergoing anesthesia. Even when guidelines are provided, many respondents indicated they would not follow them. Our data also highlight that the decision to provide stress dose steroids is related to the proposed procedure. Finally, given the significant variation of practice, a need for future research is identified with an eye to change current practice recommendations.
References:

BACKGROUND
Case reports in pediatric anesthesia provide an opportunity to drive hypothesis
generation and testing for future clinical applications and research. However, their
quality and impact on anesthesia scientific literature is largely unknown. The goal of our
study was to assess the quality of published pediatric anesthesia case reporting using
the Case Report (CARE) guidelines and the bibliometric impact of published pediatric
anesthesia case reports and identify factors associated with high citation rates.

METHODS
This systematic review was exempt from local ethics board approval. Pediatric
anesthesia case reports published over a ten year period from 2005 to 2014 were
identified on Medline and Embase and evaluated according to predefined criteria.
Quality of case reports was assessed using the CARE guidelines Score. Each report
was categorized into low quality (scores 0 to 10), lower medium quality (scores 11 to
18), upper medium quality (scores 18 to 23), and high quality (scores 24 to 30). Patient
demographic data were extracted. The Anesthesia Quality Institute (AQI) Pediatric
Outcome framework was used to extract patient data such as pre-existing comorbidities
(PCM) and untoward events. These data were defined as patient case factors in our
study. Bibliometric impact (citations) of case reports published prior to 2011 was
assessed using Scopus. Quantitative data was analyzed using descriptive statistics and
non-parametric tests as appropriate. Univariate analysis identified patient case factors
independently associated with high citation rates which were then included in a
multivariate model predicting high citation. A p-value
RESULTS
628 case reports originating from 51 countries and published across 144 journals (English) were included for analysis. The number of case reports published each year decreased from 87 in 2005 to 37 in 2014. Overall, cases were of upper medium quality reporting with a mean CARE checklist score of 18.6 (median 19; range 0-26). Only 3% (17/628) of case reports were of high quality with the majority being lower medium quality (66%). Only forty percent of cases reported untoward events. The most commonly reported adverse events were death (5%), cardiac arrest (3.8%) and re-intubation (3.5%). Seventy-nine percent of case reports were cited. The median of citations was 3 (range = 0-129). Patient case factors predicting a high citation rate (>10) were low patient weight, cardiac surgery and the occurrence of arrhythmias requiring management. The CARE guideline score did not correlate with the number of citations.

CONCLUSION
The number of case reports published in pediatric anesthesia have decreased over a decade, are of moderate reporting quality and are frequently cited. We have identified factors that are associated with citation. Efforts are needed in improving the overall quality of case reports in pediatric anesthesia.

References:
3. A&A Case Reports. 2AD Jan 3;1 (1 ).
145876 - DEXMEDETOMIDINE USE AFTER PAEDIATRIC CARDIAC CATHETER PROCEDURES

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INTRODUCTION
Local institutional post-procedure cardiac catheterization guidelines require patients to lie still in the post-anesthetic care unit (PACU) for 1-2 hours. The aim is to reduce the risk of cannulation site bleeding but it is challenging to keep young children immobile for this period. Dexmedetomidine has beneficial sedative, anxiolytic and analgesic properties\(^1\). It is used in our institution to reduce the need for physical restraint in these patients. However, this may lead to prolonged stays in PACU and attendant risks of continued patient sedation.

Not all centres mandate a period of immobility and few routinely use sedation after cardiac catheterization. There are no reports of post-cardiac catheterization sedation with dexmedetomidine in the literature. The purpose of this study was to gather case-based data to determine whether dexmedetomidine sedation is beneficial after cardiac catheterization.

METHODS
With REB approval, we are conducting a retrospective audit of cardiac catheter cases performed before and after the introduction of dexmedetomidine. Comparison will be made between patients who did and did not receive dexmedetomidine in PACU (20 patients/group). Records were reviewed for procedure details, peri-procedural drugs administered, vital signs, sedation and analgesia use in PACU, and complications; including delay in discharge and puncture site bleeding.

RESULTS
To date, 24/40 records have been reviewed with data collection to be completed by March 2016.

Sixteen patients were administered dexmedetomidine in PACU (age range 4mth-16yr; median 2.3yrs.). Initial dexmedetomidine infusion rates varied from 0.2–0.7 mcg/kg/hr. The rate was increased in 9 cases (max infusion rate 0.7 mcg/kg/hr).
Dexmedetomidine was deemed ineffective in 1 case having reached this maximum rate. Two children had ongoing oxygen requirements (1 delaying discharge) and one was over-sedated. Three patients had mild bleeding; 2 stopped after application of local pressure, the third was receiving a heparin infusion and bleeding stopped when the infusion was discontinued. No morphine is documented in PACU for this group. Eight patients did not receive dexmedetomidine in PACU (range 4mth-14yr, median 7yrs.). No vascular complications were seen in this group. Morphine was used in 4 patients and was associated with urinary retention (n=2), nausea (n=1) and delay in discharge (n=1).

**DISCUSSION**

A retrospective audit is subject to the quality of documentation available in the records; the character of patient recovery is not quantified and sedation scoring limited. Dexmedetomidine did not reduce vascular complications in this small sample. It was associated with more frequent episodes of sedation and oxygen supplementation, but may have an analgesic-sparing effect with less associated opiates related complications. A prospective study to review the validity of the drug in this setting and the need for immobility is proposed.

**References:**

1. Pediatric Anesthesia 2015; 25(9): 877–882
INTRODUCTION
Induction of anesthesia can be a stressful experience, with up to 60% of children suffering from significant anxiety immediately before surgery [1], which is associated with a higher postoperative analgesia requirement, a higher incidence of emergence delirium, and detrimental effects on sleep and behaviour [2,3]. One strategy for reducing preoperative anxiety is Child Life preparation (CLP), which includes role-play, expectation-setting and teaching of coping strategies [4]. The aim of this study is to determine whether preoperative CLP is effective at reducing anxiety prior to induction of anesthesia.

METHODS
REB approval was obtained for a prospective, randomized controlled trial with 60 children aged 3-10 years, undergoing elective day surgery under general anesthesia expected to last ≤2 hours. We excluded children who had previous surgery, pre-identified anxiety, or anticipated mask induction of anesthesia. Upon arrival in the surgical daycare unit (SDCU), the participant was assessed for baseline observational anxiety by a research assistant (RA), using mYPAS-SF [5], which gives a score ranging from 23 (lowest anxiety) to 100 (highest anxiety). The participant was randomly assigned to the intervention (minimum 15 minutes CLP) or control group (without CLP) after the RA had left the SDCU. Participants entered the operating room (OR) with one caregiver (usually a parent), as per institutional practice, and the RA (blinded to group allocation) scored the participant’s state anxiety using mYPAS-SF, up to the time of first attempt of IV insertion. Parents and children age ≥5 years were later asked about their pre-operative experience before discharge.
RESULTS
Study recruitment is ongoing (expected to complete Apr/2016). Thus far, 28 children have been recruited, of median (range) age 4 (3–10) years, 16 male. Four children were subsequently excluded: 1 withdrew consent, 3 had re-scheduled surgery. To ensure consistency of scoring, 2 RAs observed 20 cases, with good inter-rater reliability (Spearman’s rank correlation coefficient=0.89, p < 0.0005). Median (interquartile range, IQR) baseline anxiety was 29 (23–38) in the control group and 29 (23–35) in the CLP group. Prior to IV insertion in the OR, median (IQR) anxiety was 35 (23–47) in the control group and 29 (23–33) in the CLP group, with Mann Whitney test statistic U=56.5, p=0.36. Parents and children expressed positive feedback regarding the CLP.

DISCUSSION
In general, low baseline anxiety levels were observed in these children on arrival in the SDCU. We aim to investigate whether the anticipated increase in anxiety between baseline and the OR is reduced with preoperative CLP, but this interim analysis does not provide a statistical demonstration of this effect. We anticipate being able to present completed study results at the conference.

References:
Introduction:

Strabismus surgery is associated with significant intraoperative oculocardiac events, postoperative pain, nausea and vomiting (PONV). Subtenon block has been shown to provide postoperative analgesia after strabismus surgery in children (1), and is associated with a decreased incidence of oculocardiac reflex, nausea and vomiting (2, 3). We conducted a systematic review and meta-analysis on the safety and effectiveness of subtenon block for postoperative pain in children undergoing strabismus surgery.

Methods:

We searched Medline, Embase, Cochrane, Scopus and Web of Science up to December 2015 for articles comparing the use of subtenon block with control in children undergoing strabismus surgery. We also searched reference lists of included trials and ClinicalTrial.Gov for completed or ongoing trials. Outcomes included severity of pain, number of children requiring opioid and non-opioid analgesia, PONV and intraoperative oculocardiac events block-related adverse events. Local Ethics board approval was obtained.

Risk of bias was assessed using the Cochrane Risk of Bias instrument and the quality of evidence was assessed using GRADE guidelines.

We analyzed the data using the RevMan Analyses statistical package in Review Manager (version 5.3). We pooled continuous outcomes (pain) using a random-effects model to calculate the Weighted Mean Difference or Standardized Mean Difference with corresponding 95% confidence intervals.
We pooled dichotomous outcomes (requirement for postoperative analgesic, nausea and vomiting, oculocardiac events) using a random-effects model to calculate the relative risk and corresponding 95% confidence interval.

Results:

Out of the 217 articles identified, 8 studies involving 447 participants were included for the review.

Pain scores on admission to post-anesthesia care unit (PACU) were higher in control group (SMD = 1.53 95% CI 1.07, 2.00). There was no overall difference in postoperative pain scores at 20-30 minutes between the subtenon and control group (SMD = 0.74 95% CI 0.04. 1.52). The number of children requiring opioid analgesia in the postoperative period was lower in subtenon group (RR 0.59; 95% CI [0.37, 0.92]). The incidence of oculocardiac events and vomiting was lower in the subtenon group compared with control (RR 0.41; 95% CI [0.18, 0.93]) and RR 0.41; 95% CI [0.18, 0.93], respectively. We found no difference in the number of children requiring post-operative non-opioid. The incidence of chemosis was reported in one study. There was no significant difference between the subtenon and control group.(4)

Conclusion:

Subtenon block decreases the immediate postoperative pain and opioid consumption. It decreases the incidence of intraoperative oculocardiac events and opioid related side effects.

References:

151903 - KINDERGARTEN ASSESSMENT IN CHILDREN ANESTHETIZED BEFORE AGE 4

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Introduction: Animal studies demonstrate general anesthetic (GA) toxicity in the developing brain\(^1\). Clinical reports raise concern, but the risk of GA exposure to neurodevelopment in children remains uncertain\(^2,3\).

Method: After obtaining Institutional Human Ethics Board approval, we undertook a retrospective matched cohort study comparing children exposed to GA < 4 yr to those with no GA exposure. We used the Early Development Instrument (EDI), a 104 component questionnaire, encompassing 5 developmental domains, completed in kindergarten as our outcome measure. Mixed effect logistic regression models were developed to generate estimates for single vs multiple GA exposure and to compare both single and multiple exposure by age < or > 2 yr. Sociodemographic and physical confounders were incorporated as covariates in the models.

Results: A total of 18,056 children were studied: 3850 single GA and 620 multiple GA, matched to 13586 non-exposed children. In children < 2yr, there was no independent association between single or multiple GA exposure and EDI test results. Paradoxically, exposure to a single GA between 2-4 yr was associated with deficits, most significant in Communication/General Knowledge (Estimate: -0.7, CI: -0.93 to -0.47, p< 0.0001) and Language/Cognition (Estimate: -0.34, CI: -0.52 to -0.16, p< 0.0001) domains. Multiple GA exposure at 2-4 yr demonstrated a non-significant trend toward greater deficit.

Conclusion: These findings refute the assumption that the earlier the GA exposure in children, the greater the likelihood of long term neurocognitive risk. We cannot confirm an association between multiple GA exposure and increased risk for neurocognitive impairment. These results suggest that either the age of vulnerability occurs at a later stage of brain development in children compared to animals, or time may modulate the potential effects of earlier exposure. Alternatively, confounding by indication cannot be ruled out.
References:

152286 - A NOVEL INTERVENTION FOR REDUCING PERIOPERATIVE ANXIETY

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Introduction: Preoperative anxiety (PA) affects up to 5 million children in North America each year. PA is predictive of multiple adverse outcomes, including an increased risk of separation anxiety, elevated analgesic use, postoperative emergence delirium and delayed recovery. The most common interventions used to reduce PA are preoperative sedation and/or complex multi-faceted preparation programs. Unfortunately, these interventions are not always readily accessible, can be time-intensive, or are associated with undesirable side effects and high costs. A recent systematic review suggested that audiovisual interventions are effective at alleviating PA, though existing solutions are prohibitively time-consuming and costly. To date, no study has examined the effects of a tablet-based, virtual-reality intervention on PA. Accordingly, we developed a multi-sensory interactive application, Story-Telling Medicine (STM), to prepare children for complex perioperative and surgical procedures. STM is an age-appropriate, customizable program that simulates the children’s hospital environment by guiding children through the settings they will encounter prior to surgery. Compared to children who receive Standard of Care (SC), we hypothesize that the use of STM+SC will lead to a reduction in self-reported children’s perioperative anxiety.

Methods: The Local Research Ethics Board’s approval was obtained. Forty children (aged 8-13 years) undergoing elective outpatient surgery (e.g., tonsillectomy) were randomly allocated to receive either STM+SC (n= 20) or SC only (n= 20) 7-14 days before surgery (T1). Self-rated perioperative anxiety levels were measured using Children’s Perioperative Multidimensional Anxiety Scale (CPMAS) at T1, on the day of surgery (T2), and one month postoperatively (T3).
**Results:** Chi-square analyses revealed no significant differences in baseline characteristics between the two groups. An independent-samples t-test was conducted to compare perioperative anxiety in STM+SC and SC alone. There was a significant difference in the mean change in anxiety scores for STM+SC (ΔM=246.50, SD=127.18) compared to SC alone (ΔM=126.60, SD=122.45); t(27)=2.59, p=0.015 (Figure 1).

**Discussion:** Reductions in anxiety were greater in children in the STM+SC than SC group alone, suggesting that STM is effective in reducing children's perioperative anxiety. Future studies should examine whether these behavioural changes have corresponding physiological correlates and to quantify the optimal dosage required. There is a relative paucity of research evaluating the effects of AV interventions in reducing perioperative anxiety in children undergoing surgery. This is the first study to demonstrate the effectiveness of a novel, tablet-based intervention for reducing perioperative anxiety in children undergoing surgery. Since many children do not have access to services to optimize PA, STM has the potential to provide optimal perioperative care for every child in need and can be adapted to many Canadian hospital settings. STM may represent a cost-effective way to improve children's health and ease the familial and societal costs of PA.

**References:**

3. Paediatric Anaesthesia 2010 20: 318 -22
5. J Pediatric Psychology 2015 In-press
6. Psychological Assessment 2015 Submitted
Introduction: Obstructive sleep apnea (OSA) affects 2-6% of children, the most common cause being enlarged tonsils and adenoids. Prompt diagnosis and treatment of OSA is vital as untreated OSA is linked to behavioral deficits, growth and metabolic disorders and negative cardiovascular consequences. The presence and severity of OSA is difficult to establish on clinical history alone, and polysomnography (PSG) is the gold standard diagnostic tool. PSG is resource intensive and not widely available, resulting in around 90% of children undergoing adenotonsillectomy without PSG. Severity of OSA is relevant in peri-operative planning to ensure safe management of these patients. Several pediatric deaths have been attributed to post-operative inflammation compounded by respiratory depression from opiate administration following adenotonsillectomy, in patients with OSA. This study aims to demonstrate the feasibility of using smartphone-based pulse oximetry at home to provide an objective measure of OSA severity and provide an additional tool in the management of adenotonsillectomy patients.

Methods: With Research Ethics Board approval and written, informed consent, smartphone-based pulse oximetry and sleep quality data is collected and compared for 3 nights pre-operatively and 3 consecutive nights immediately post-adenotonsillectomy using a non-invasive adhesive sensor attached to the subject’s toe overnight, linked to a custom-built application. This records heart rate, blood oxygen saturation (SpO₂), photoplethysmography and a signal quality index ranging from 0 to 100. Pulse oximetry recordings lasting at least 5 hours, with a signal quality exceeding 70 throughout, are considered successful. This study is ongoing, and is anticipated to include 150 subjects over a 3-year period.

Results: 20 subjects have been recruited so far. Median age 5.49 years, median weight 23.8kg. N=2 cases withdrew from the study after initial recruitment. Only n=2 cases (10%) had previously undergone in-hospital PSG; Pre-operative diagnosis: n=16 (80%) sleep-disordered breathing; n=2 (10%) recurrent tonsillitis; n=1 (5%) combined tonsillitis and sleep-disordered breathing; n=1 (5%) nasal obstruction.
Adenotonsillectomy was performed in n=16 (80%) cases, isolated tonsillectomy n=2 (10%), adenoidectomy n=2 (10%). Of those continuing in the study 85% had at least one pre-operative successful recording and 67% of the post-operative recordings performed so far (n=9) were successful.

**Conclusion:**
The initial phase of this study has shown it is feasible to obtain recordings of sufficient quality at home, by parents, to enable an objective measurement of OSA severity that may help to minimize post-operative risk. Once data collection is complete, we plan to use advanced signal processing to characterize overnight Sp0₂ dynamics and additionally use an estimation of heart rate variability to augment assessment of OSA severity. This tool may be capable of assisting clinicians in their management of peri-operative adenotonsillectomy cases.

**References:**
REGIONAL AND ACUTE PAIN POSTER DISCUSSION
Sunday, June 26
8:00 AM - 9:45 AM

Moderator: Derek Dillane, University of Alberta, Ottawa, Ontario
Moderator: James Green, University of Alberta, Edmonton, Alberta

143038 - DURAL MOVEMENT WITH EPIDURAL LOSS-OF-RESISTANCE IN PIGS
Presenting Author: William P. McKay, University of Saskatchewan, Saskatoon, Saskatchewan
Co-Author(s): Hardave S. Gill, Jonathan Gamble, Barbara Ambros

146364 - PARAVERTEBRAL BLOCK VERSUS TWO STEP SURGICAL BLOCK IN BREAST SURGERY
Primary & Presenting Author: Shachar Ben-Zeev, University of Ottawa, Ottawa, Ontario
Co-Author(s): Michelle Chiu, Anne Lui, Daniel McIsaac

152801 - TOTAL SHOULDER ARTHROPLASTY SAME DAY DISCHARGE: ERAS PILOT PROJECT
Presenting Author: Natalie Melton, Western University, London, Ontario
Primary Author: Shalini Dhir, Western University, London, Ontario
Co-Author(s): George Athwal, Darren Drosdowech, Kevin Armstrong

152938 - SINGLE VS MULTIPLE INJECTION ULTRASOUND GUIDED PARAVERTEBRAL BLOCKS
Primary & Presenting Author: Vishal Uppal, Dalhousie University, Halifax, Nova Scotia
Co-Author(s): Rakesh Sondekoppam, David Johnston, Parvinder Sodhi, Shalini Dhir, Luz Maria Lopera Velasquez, Sugantha Ganapathy

152953 - SYSTEMIC REVIEW OF RECTUS SHEATH BLOCK ON POSTOPERATIVE PAIN
Primary & Presenting Author: Andy Lo, Calgary Anesthesiology, Calgary, Alberta
Co-Author(s): David Nguyen, Keith Anderson
153020 - EPIDURAL ANALGESIA IN HEPATIC RESECTION PATIENTS
Presenting Author: Sneha Lohan, Queen's University, Brampton, Ontario

Primary Author: Kim Turner

Co-Author(s): Michael McMullen, Rachel Phelan, Kim Turner, Glenio Mizubuti, Sulaiman Nanji, John Murdoch

153042 - ECHOGENIC NEEDLES AND BEAM-STEER TO ASSIST ULTRASOUND VISUALIZATION
Primary & Presenting Author: Christopher Prabhakar, University of British Columbia, Vancouver, British Columbia

Co-Author(s): Rakesh Sondekoppam, Vishal Uppal

153051 - THE EFFECTS OF EPIDURAL ANALGESIA ON POSTOPERATIVE BOWEL MOVEMENTS
Primary Author: Na Young Kim, Department of Anesthesiology and Pain Medicine, Anesthesia and Pain Research Institute, Yonsei University College of Medicine, Seoul, Korea, Republic Of

Presenting Author: Jong Min Park, Department of Anesthesiology and Pain Medicine, Anesthesia and Pain Research Institute, Yonsei University College of Medicine, Seoul, South Korea
INTRODUCTION
There has long been speculation that loss-of-resistance (LOR) with constant pressure while advancing the needle results in the injectate pushing the dura away from the needle point. This might help prevent inadvertent dural puncture. In an earlier cadaver study we confirmed the theoretical possibility of epidurally-injected liquid (but not air) producing a jet that pushes the dura away from the needle tip at the onset of LOR. In a clinical study in the operating room (manuscript in preparation) we found great variance among practitioners in LOR volume (mean 4ml), injection pressure, and time of injection. We hypothesized that a range of injection pressures would be optimal. In the present study, in a porcine model, we used saline with x-ray contrast to fluoroscopy the lumbar spine while a video camera recorded the plunger and barrel during LOR epidural injection at various injection pressures. The primary measurements were the amount of LOR volume injected into the epidural space or the subcutaneous tissue and the amount of dural displacement caused by the LOR injectate.

METHODS
Following university ethical approval, and using a device to produce known constant pressures of injection, we performed lumbar epidural injections in 6 male pigs, approximately 30kg and 6 to 8 weeks old, immediately after they were sacrificed in an unrelated hemodynamic study. Seven injection pressures were used that varied from 84 to 3040torr, all with 4ml injection volume. Fluoroscopic and video recordings were digitized and analyzed using the VideoPad® computer program.

RESULTS
Sixteen of 18 attempts were technically successful. Results are depicted in the chart below, which shows increasing injection pressures along the X-axis, with 3 outcomes summed in the bar graphs. Ideal outcomes are: 1) all 4ml of injected liquid goes into the epidural space (white bars: epidural injected volume); 2) the dura is moved away from the needle tip by the injection (black bars: mm movement); and 3) no injectate is lost into the tissues (hatched bars: volume lost into the tissues). At the lowest pressure, the injected jet does not move the dura – this is undesirable. At the highest injection pressures, injection of most or all of the liquid is into the tissues – this too is undesirable. Ideal injection pressures occur from 190 to 507torr.
DISCUSSION
This study confirms the speculation, and suggests a range of injection pressures that should be investigated. A study has been done with constant LOR pressure of 50torr$^3$, and there is a commercially available LOR injection device, the Episure™, that has been shown to be efficacious, but for which the injection pressure is not known. The present study may point the way to future research to find ideal injection pressure and volume. Application of these results in “pediatric” pigs to human adults must be done with caution, especially with respect to injection into the tissues.

References:

INTRODUCTION

Recovery from breast surgery is often complicated by pain, nausea, sedation and impaired functional recovery. Compared to placebo, paravertebral blockade (PVB) decreases postoperative pain and nausea. However, PVB is not without risk; evidence regarding its superiority to other analgesic techniques is limited by factors including small sample size, inadequate blinding and lack of active comparator. This study’s objective was examining the impact of PVB compared to surgical field block (SFB) on postoperative quality of recovery (QoR), pain, and shoulder function.

METHODS

Following ethical approval we conducted secondary analysis of data collected for a published double blinded randomized trial (NCT01089933). Breast cancer surgery patients were randomized to PVB or SFB. The PVB group had T1-T6 PVB with 5ml 0.5% Ropivacaine per level and saline injected by surgeon into the wound and in the drain. The SFB group had saline subcutaneous injections at T1-T6 and 0.5% Ropivacaine injected by surgeon into the wound (10ml) and in the drain (20ml). Differences in QoR on postoperative day (POD) 2 were assessed using a Wilcoxon test. Differences in the proportion of patients with pain numeric rating scale (NRS) >3 on POD2 were assessed using a Chi-square test. Differences in Constant score (a validated 100-point scale to measure shoulder function) at first follow up were assessed using a t-test. Generalized linear models were used for QoR and NRS repeated measures across the first 7 PODs. P-values < 0.05 were considered significant.
RESULTS
129 patients were recruited, 65 were randomized in a concealed manner to the PVB group, 64 to the SFB group. Characteristics between groups were similar. There was no difference in POD 2 QoR (PVB:18,IQR 17-18;SFB:17,IQR 17-18, P= 0.83), proportion of patients with NRS>3 on POD 2 (PVB:16.4%;SFB:14.1%, P=0.81), or Constant score (PVB:75 in PVB;SFB: 69,P=0.68) between the groups.Differences in QoR and NRS were not significant in repeated measures analysis (P=0.76,P=0.25 respectively).

DISCUSSION
To our knowledge, this is the first adequately blinded randomized trial evaluating the impact of PVB versus an active comparator on recovery, pain and function after oncologic breast surgery. There does not appear to be significant benefit from PVB compared to SFB on any of our measured outcomes in the early postoperative period, while previous analysis of this data shows no benefit in terms of chronic postsurgical pain. We hypothesize that SFB may be superior to surgical local anesthetic infiltration, and may explain the divergence of our findings from previous studies of PVB. These findings should be considered when weighing the risks and benefits of neural versus surgical field block in similar patient populations.

References:
BACKGROUND
Patients undergoing Total Shoulder Arthroplasty (TSA) normally stay in hospital for 2-3 days. Some barriers to discharge are medical (pain, post-operative nausea and vomiting (PONV) respiratory depression) and some are related to usual hospital practices (timing of allied health professionals' (AHP) assessment, timing of post-operative X-rays etc.). If these barriers are overcome, patients have the potential to return home safely on the day of surgery.

METHODS
In this open-label pilot study we evaluate the use of a continuous interscalene block (CISB) for shortening length of stay. After obtaining ethics board approval and using a set of inclusion and exclusion criteria to identify patients without severe medical co-morbidities, we screened and recruited 10 patients undergoing TSA. Following recruitment, we used a modified Enhanced Recovery After Surgery (ERAS) protocol to optimize the patients’ in the perioperative period.

We used a set of preoperative, intraoperative and postoperative interventions to reduce pain, nausea and respiratory depression. These included short-acting anesthetic agents, CSIB and PONV prophylaxis. To address non-medical barriers for discharge, we created a streamlined multi-disciplinary process to ensure that patients receive appropriate care from AHP in a timely fashion.

RESULTS
67% of patients met discharge criteria within 23 hours of admission (mean readiness-to-discharge time of 10 hours +/- 1 h post PACU admission). The remaining patients met discharge criteria at a mean of 33 h post-admission to PACU, due to respiratory concerns related to pre-existing but un-identified conditions.
DISCUSSION
We have been able to create and test a screening tool to identify patients that can qualify for same day TSA process. Through the use of our modified ERAS protocol including CSIB for analgesia, we can control factors that increase post-operative length of stay. Through the use of pre-admission screening tool, modified ERAS protocol and streamlined multi-disciplinary process, TSA can be successfully performed as an outpatient procedure in a significant subset of patients. We will perform a formal trial in the near future to evaluate our protocols in a larger setting.

References:
BACKGROUND
Paravertebral block (PVB) has been shown to provide excellent analgesia for major breast surgeries resulting in reduced narcotic consumption, reduced nausea, improved quality of recovery, reduced chronic pain and possibly reduced metastasis with breast cancer.1-3 Our objective was to investigate the extent of dermatomal spread of PVB when equal volumes of local anesthetic are injected at one versus five paravertebral sites for patients undergoing major breast surgery. In addition, we wish to compare the performance time and duration of analgesia.

METHODOLOGY
After local REB approval, 72 patients undergoing a unilateral mastectomy with or without axillary node dissection were randomized to receive either single or multiple injections PVB. The PVB was performed in prone position under real-time ultrasound guidance using a para-sagittal approach.4 Patients and assessors were blinded to group allocation. The patients in single injection group received single injection PVB at T3-T4 level with 25 ml of 0.5% ropivacaine and four subcutaneous sham injections. Patients in the multiple injection group received five injections of PVB from T1 to T5 level. 5 ml of 0.5% ropivacaine was injected at each level. Pleural drift was used as a sign of correct needle tip location and local anaesthetic spread. The pinprick method was used to assess the extent of dermatomal blockade, 20 minutes following the completion of procedure. All patients received a standardized general anesthesia for the surgery. Any adverse events including pneumothorax, epidural spread, LA toxicity/seizure, total spinal, were recorded.
RESULTS
Table 1 shows main results. The mean (SD) dermatomal spread was not significantly different for single-injection group [4.1 (1.5)] compared to multiple-injection group [4.5 (1.3)], mean difference 0.4 segments (95% CI: -0.3 to 1.0 segments). The time to perform a single-injection PVB was shorter (6.2 min) when compared to multiple-injection PVB (11.9 min), mean difference 5.7 min (95% CI: 2.7 to 8.6 min). There were no reported complications attributable to PVB in either group.

DISCUSSION
Our study shows that when PVB is performed under ultrasound guidance, single level PVB produces similar dermatomal spread when compared to multiple level PVB. This is contrary to the previous published literature when landmark techniques were used. The cephalad and caudad dermatomal spread was similar in both the groups. The duration of block (as assessed by presence of numbness) was not statistically different between the groups.

We conclude that with ultrasound-guidance PVB is a safe procedure with low complication rate. The single injection PVB is equivalent to multiple injection PVB with regards to dermatomal spread and duration of analgesia. Single injection technique takes less time to perform and may be associated with less patient discomfort. Therefore, single injection PVB should be preferred over multiple injection technique.

References:
INTRODUCTION
Patients undergoing intraabdominal surgery experience significant pain from incisions to the abdominal wall. The rectus sheath block (RSB) is a regional technique that provides sensory blockade to the anterior midline abdominal wall. Our systematic review aims to examine the analgesic efficacy of the RSB on postoperative pain in adult patients undergoing intraabdominal surgery.

METHODS
A systematic search was executed on the US National Library of Medicine database (MEDLINE), Excerpta Medica database (EMBASE), Cochrane Central Database of Randomized Controlled Trials (CENTRAL) and Cochrane Database of Systematic Reviews (CDSR). We searched for randomized controlled trials (RCTs) that compared the RSB to placebo or local infiltration anesthetic (LIA), using keywords such as“rectus sheath”. We also pursued grey literature for additional papers which included Google Scholar and searched through the appendices of relevant papers. We sought opioid consumption in IV morphine equivalent (mg) at postoperative intervals 0 – 24 and 24 – 48 hours (h). Pain outcome was assessed using the 0 - 10 cm Visual Analogue Scale (cm) at postoperative 1, 6, 12, 24 and 48 h. A meta-analysis was performed using random effects model with Review Manager 5.3.

RESULTS
Seven RCTs with a total of 364 patients were included in our meta-analysis. Five trials used single-shot blocks and two trials used catheters for continuous blocks. Compared to control groups, single-shot RSB reduced IV morphine consumption at postoperative 0 – 24 h by 8.55 mg (95% CI: -11.21, -5.88; P < 0.00001) and at postoperative 24 – 48 h by 10.08 mg (95% CI: -17.57, -2.58, P = 0.008). Continuous RSB reduced IV morphine consumption at postoperative 0 – 24 h by 13.85 mg (95% CI: -24.93, -2.76; P = 0.01) and at postoperative 24 – 48 h by 4.00 mg (95% CI: -7.30, -0.70; P = 0.02).

Compared to control groups, single-shot RSB reduced mean VAS score at postoperative 1 h by 3.81 cm (95% CI: -6.06, -1.55; p < 0.00001). We were unable to demonstrate a significant difference in mean VAS score between RSB and control groups at postoperative 24 (95% CI: -0.21, 0.22; P = 0.96) and 48 h (95% CI: -1.40, 0.54; P = 0.03).
CONCLUSION
Our study shows that the RSB had an opioid sparing effect in adult patients undergoing elective intraabdominal surgeries up to postoperative 48 hours. Therefore, it may be a useful option to consider as part of multimodal pain management in this population.

References:
1. Surg Obes Relat Dis 2005 1: 12-16
2. Ain-Shams J of Anaesth 2015 8: 100-106
8. Cochrane Collab 2014 RevMan 5.3 [Computer program]
INTRODUCTION
Epidural analgesia is often the preferred choice for pain management following partial liver resections at our academic center. However, the improved postoperative pain control must be balanced against the risks of bleeding in the setting of an anticipated perioperative coagulopathy. With the potential for significant intraoperative blood loss and associated reduction in the clotting factors, hepatic resections are frequently associated with administration of fresh frozen plasma and vitamin K (1). In this quality improvement initiative, we sought to retrospectively assess how the use of epidural analgesia, influenced postoperative recovery with a particular emphasis on the perioperative utilization of fresh frozen plasma to correct the post operative coagulopathy in patients receiving epidural analgesia.

METHODS
Following research ethics board approval, charts of patients who have undergone liver resection surgeries at our institution in the past 5 years were reviewed retrospectively. Several parameters such as patient demographics, use of epidural analgesia, timing of epidural removal, laboratory values (INR, CBC) and the use of FFP and/or vitamin K were recorded. Pain scores (static and dynamic) were obtained from the electronic database of structured daily assessments performed by our acute pain service on each postoperative day.

RESULTS
The majority of the patients reviewed (142/176, 81%) received an epidural catheter. The average time to removal of these epidural catheters was 3.4 ± 1.2 days with a range from 0-7 days. On the day of removal the average INR was 1.25 ± 0.16 and a delay in removal due to an elevated INR was documented in 15 patients. On the day of removal, 18 patients had an INR >1.4 and FFP was effectively administered to 8 patients to reverse the coagulopathy without any noted complications. Vitamin K was
administered to 48 patients during the postoperative period. Furthermore, of the 142 epidurals, 25 were converted to PCA pumps due to epidural failure and 44% patients reported moderate to severe pain upon activity on POD1.

**DISCUSSION**
Following an initial review, the authors believe that our current practice of using epidural analgesia is safe and has the potential to facilitate postoperative recovery of patients undergoing hepatic resections. However, this preliminary review suggests that there is room for improvement in particular: addressing mechanisms to further reduce the failure rate, and educating all those involved in the postoperative care regarding the unique concerns regarding perioperative coagulation. The changes in postoperative coagulation altered management in a minority of cases (11%) and even fewer involved the utilization of blood products (6%). We intend to conduct further analysis of the database to help determine predictors of the extent of postoperative coagulopathy and options for management that are acceptable to the perioperative team involved in the care of these patients.

**References:**

1) Anesthesia 2013 68: 628-635
INTRODUCTION
Proper visualization of the needle is of paramount importance during ultrasound-guided procedures. As the angle of needle insertion in relation to the ultrasound probe increases the needle becomes more difficult to visualize. Echogenic needles use special coatings or reflectors to improve visualization. As well, beam-steering technology allows the ultrasound beam to be angled to increase reflection of the needle at more acute angles. Currently there is no appreciation for what is the best technology to use at moderate angles of insertion. We sought to compare the effects of medium and steep angle beam steering on visibility of echogenic and non-echogenic needle at 40, 50 and 60 degrees of angle insertion.

METHODS
The local research ethics review board waived the need for ethics approval for this study. Non-echogenic and echogenic needles were individually inserted into uncooked pork loin under ultrasound guidance at 40°, 50°, and 60° with respect to the ultrasound probe by an experienced regional anesthesiologist. Ultrasound still images of the needle were obtained at each angle with or without the use of beam-steering (medium or steep setting). Participants were either consultant anesthesiologists with current clinical experience in regional anesthesia, or anesthesia residents who had completed a one month rotation in regional anesthesia. Participants were blinded to needle type or whether beam-steer was used to obtain each of the images and were asked to assess needle visualization of the still images on a 0-10 scale. Needle visualization score (0-10) were compared using a repeated-measures ANOVA. Tukey’s test was used for pairwise comparison (not presented in abstract). Scores were defined as poor (0-3.3), intermediate (3.4-6.6), or good (6.7-10).

RESULTS
Twenty participants completed the study. Mean scores (SD) and p-values by repeated measures ANOVA are found in Table 1:
At 40° non-echogenic needle scores improved from poor to good with both medium and steep beam-steering. For echogenic needles, the score improved from intermediate to good with steep beam-steering. At 50° and 60° non-echogenic needle scores were poor with or without beam-steering. Echogenic needles scores at 50° were good with or without beam-steering. At 60° echogenic needle scores were intermediate and improved to good with steep beam-steering.

CONCLUSIONS

At 40 degree needle insertion, beam-steer offers benefit to both echogenic and non-echogenic needles. At 50 and 60 degrees, echogenic needles are superior in terms of visualization and beam-steering might have a limited role.

References:

INTRODUCTION
Sympathetic hyperactivation is one of the causes of postoperative ileus, which occurs frequently after abdominal surgery and adversely influences the patient’s prognosis. (1) We aimed to investigate whether sympatholytic effect of epidural analgesia could attenuate postoperative ileus in patients undergoing laparoscopic gastrectomy.

METHODS
This study was approved by local Ethics Committee. Thirty-nine patients were randomized to receive general anesthesia combined with either epidural analgesia (n = 19) or intravenous analgesia (n = 20). The primary goal was to compare postoperative bowel movements by evaluating the time to first flatus. The balance of the autonomic nervous system, duration of postoperative hospital stay, and pain scores were assessed.

RESULTS
The time to first flatus was significantly shorter in the Epidural group than in the Intravenous group (63.9 ± 9.1 h vs. 81.2 ± 19.2 h, P = 0.006). During pneumoperitoneum, the low-frequency/high-frequency powers ratio was maintained in the Epidural group compared with the baseline value, whereas it was increased in the Intravenous group (P < 0.05). The length of postoperative hospital stay was 5.6 ± 0.5 days in the Epidural group and 6.2 ± 1.9 days in the Intravenous group (P = 0.076). Patients in the Epidural group had lower pain scores and required fewer additional analgesics at 1 h postoperatively.
DISCUSSION
Epidural analgesia facilitated bowel movements and reduced early postoperative pain in patients undergoing laparoscopic gastrectomy. This may be attributed that epidural analgesia provided better sympatholytic and analgesic effects compared to intravenous analgesia.

References:
1. Medicine 2015 94(24):e959
146955 - THE IMPACT OF DELAYED EMERGENCY SURGERY ON IN-HOSPITAL MORTALITY
Primary & Presenting Author: Karim Abdulla, University of Ottawa, Ottawa, Ontario
Co-Authors(s): Daniel I. McIsaac, Alan Forster
Track: Patient Safety

149277 - IMPROVED PREOXYGENATION IN MORBIDLY OBESE: POSITION & VENTILATION
Primary & Presenting Author: Antony Carrier-Boucher, Departement of Anesthesiology and Critical Care, Université Laval, Quebec, Quebec
Co-Authors(s): Jean Bussières, Étienne Couture, Steeve Provencher, Simon Marceau, Nathalie Gagné
Track: Airway Management

152942 - DOES ELEVATED PERIOPERATIVE LACTATE TRANSLATE INTO POOR OUTCOMES?
Primary & Presenting Author: Erin Bruce, University of Calgary, Calgary, Alberta
Co-Authors(s): Sarah Rose, Kaylene Duttchen
Track: Critical Care Medicine and Trauma

153145 - RETROCLAVICULAR BLOCK IN OBESE PATIENTS: A FEASIBILITY STUDY
Presenting Author: Pascal Laferriere-Langlois, Centre Hospitalier Universitaire de Sherbrooke, Sherbrooke, Quebec
Primary Author: Julien Roy-Blais, Centre Hospitalier Universitaire de Sherbrooke, Sherbrooke, Quebec
Co-Authors(s): Sarah Lun, Yanick Sansoucy, Pablo Echave, Pablo Echave, Yanick Sansoucy
Track: Regional Anesthesia
150998 - RCT OF CONTINUOUS PULSE OXIMETRY AND WIRELESS CLINICIAN NOTIFICATION
Primary & Presenting Author: Matthew A. Chong, University of Western Ontario, Scarborough, Ontario

Co-Authors(s): James Paul, Norman Buckley, Toni Tidy, Diane Buckley, James Paul, Norman Buckley, Toni Tidy, Diane Buckley

Track: Equipment/Monitoring

152732 - A SYSTEMATIC REVIEW EXAMINING POST-OPERATIVE DELIRIUM ON MORTALITY
Primary & Presenting Author: Gavin M. Hamilton, Department of Anesthesiology, The University of Ottawa, Ottawa, ON, Ottawa, Ontario

Co-Authors(s): Kathleen Wheeler, Joseph Di Michele, Manoj Lalu, Daniel McIsaac

Track: Critical Care Medicine and Trauma
RESIDENTS COMPETITION
Monday, June 27
8:00 AM - 9:45 AM

146955 - THE IMPACT OF DELAYED EMERGENCY SURGERY ON IN-HOSPITAL MORTALITY
Primary & Presenting Author: Karim Abdulla, University of Ottawa, Ottawa, Ontario

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152732 - A SYSTEMATIC REVIEW EXAMINING POST-OPERATIVE DELIRIUM ON MORTALITY
Primary & Presenting Author: Gavin M. Hamilton, Department of Anesthesiology, The University of Ottawa, Ottawa, ON, Ottawa, Ontario

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Track: Critical Care Medicine and Trauma
INTRODUCTION
Emergency surgery patients often experience delays between presentation and surgical intervention, the causes of which are multifactorial.1-4 Surgical delay is associated with mortality in hip fracture patients5. Indication bias likely confounds this association because sicker patients tend to wait longer. The impact of delayed surgery on outcomes after other surgeries is poorly described. To improve emergency operating room (OR) access, our institution introduced a 5-level prioritization system, based on acuity and surgical indication; each level was assigned an acceptable surgical wait-time. Patients could not be booked for surgery until they were clinically ready to come to the OR. The objective of this study was to measure the association between surgical delay and in-hospital mortality.

METHODS
Following ethics approval, we performed an observational cohort study at a tertiary-care health sciences center. All adult emergency non-cardiac surgery patients were identified between January 2012 and October 2014. Surgical delay was defined as a wait-time from surgical booking to OR entry in excess of priority specific wait-time (see table for wait-time definitions). Delayed patients were propensity score (PS) matched on a 1:1 basis without replacement to non-delayed patients. We used variables that accounted for characteristics of their hospital admission, preoperative hospitalization, patient characteristics, physiologic instability, surgical urgency and risk. The relative and absolute association between delay and mortality were calculated. Pre-specified sensitivity analyses, including a generalized additive model to investigate the continuous association between OR wait-time and in-hospital mortality were used to test the robustness of our primary analysis.

RESULTS
15160 patients were identified; 2820 (18.6%) had delayed OR access. System factors accounted for 86% of all documented delays. Delayed patients had an in-hospital mortality rate of 2.6% compared to 4.9% for non-delayed patients (crude odds ratio 1.59, 95%CI 1.30-1.93). All delayed patients were successfully PS-matched and balance of covariates was achieved between groups. Within the PS-matched cohort, delay was significantly associated with mortality (odds ratio 1.56, 95%CI 1.18-2.06; absolute risk increase 1.67%; number needed to treat to harm=60). This finding was
confirmed in sensitivity analyses.

**DISCUSSION**
In a cohort of emergency surgical patients with known ready for surgery status and detailed patient-level covariates to account for indication bias, delayed operating room entry after booked emergency surgery was associated with increased risk of in-hospital mortality across surgical specialties. For every 60 delayed surgeries, one extra death occurred; this equates to 80 excess deaths at our hospital during the study period. Importantly, system issues underlie most delays, and will need to be addressed to improve patient flow and outcomes.

**References:**

INTRODUCTION
Airway management of the morbidly obese is a risky period. This population, at high risk of rapid desaturation\(^1\), requires a fast endotracheal intubation, but poor glottis visualization often makes it more difficult\(^2\). With good patient positioning\(^3\) and ventilation\(^4\) optimization during preoxygenation, it is possible to lengthen the safe non-hypoxic apnea period.

OBJECTIVE
The objective of this randomized clinical trial was to compare the effects on the safe non-hypoxic apnea time during general anesthesia induction of: 1) Reverse Trendelenburg position (table inclination 25°) associated with a ventilator assisted spontaneous ventilation (RT/PPV); versus 2) the frequently used combination of beach chair position (back up inclination 25°) with spontaneous ventilation without positive pressure (BC/SV)(Figure 1).

METHODS
After approbation of local REB and written consent obtained, fifty morbidly obese patients were recruited in this clinical trial during their preoperative assessment and randomized in the operative room. After standard monitoring was installed, patients were positioned and preoxygenated, according to their randomization, for three minutes with a mouth piece. In the RT/PPV group, the anesthesia ventilator was set with an inspiratory pressure of 8 cm H\(_2\)O, positive end-expiratory pressure of 10 cm H\(_2\)O, FiO\(_2\) at 1.0, with a fresh gas flow of 18 L/min. In the BC/SV group, the ventilator was set in spontaneous ventilation at FiO\(_2\) 1.0, with a fresh gas flow of 18 L/min. After the preoxygenation period, induction and intubation were done according to the anesthesiologist. Endotracheal tube position was confirmed with a fibrescope. The main issue was safe non-hypoxic apnea time (time between induction and saturation (SpO\(_2\)) of 92%). Secondary issues were the time to obtain an end-tidal oxygen fraction (EtO\(_2\)) of 0.90, maximal EtO\(_2\) during the preoxygenation period, and time to obtain a SpO\(_2\) of 97% during the ventilation resumption.
RESULTS
Forty-eight patients were analyzed (24/group). Subjects were comparable according to age (46 ± 11 vs 41 ± 9 years, p=0.059) and body mass index (47.9 ± 6.4 vs 47.3 ± 5.2, p=0.727). Safe non-hypoxic apnea time was significantly longer in the RT/PPV resulting in an increase of 41.5 seconds (16%). The RT/PPV was also associated with a shorter time to obtain an EtO2 of 0.90, a higher maximal EtO2 during preoxygenation and a faster return to 97% during ventilation resumption (Figure 1).

CONCLUSION
Reverse Trendelenburg position associated with positive pressure ventilation lengthens the safe non-hypoxic apnea time in the morbidly obese population, allowing a greater margin of time available for the endotracheal intubation and minimizing the danger of hypoxemia in this high-risk population.

References:
3. Obesity Surgery 2003, 13: 4-9
153145- RETROCLAVICULAR BLOCK IN OBESE PATIENTS: A FEASIBILITY STUDY

Author(s)
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BACKGROUND AND OBJECTIVES
Regional anesthesia has many advantages in obese patients.¹ However, needle angulation as well as depth of structures may diminish visibility and thus create a technical challenge. The aim of this feasibility study was to determine, in an obese population, the surgical success rate of the novel retroclavicular block, which allows a more perpendicular needle angle than the coracoid approach.²

METHODS
After ethics committee approval, 32 patients with BMI ≥ 30 kg/m² scheduled for upper limb surgery received an in-plane, single-shot, ultrasound-guided (US) retroclavicular block with 20 mL of mepivacaine 1,5% and 20 ml ropivacaine 0,5% with epinephrine 2,5 μg/mL under the axillary artery (figure 1). Exclusion criteria were pregnancy and classic contraindications to regional anesthesia. At 10, 20 and 30 minutes, sensitive block (SB) and motor block (MB) were assessed on three points for each nerve of the forearm (SB ; 0 : no effect, 1 : analgesia, 2 : anesthesia; BM ; 0 : no effect, 1 : weakness, 2 : paralysis). Primary outcome was defined as adequate anesthesia for surgery. At 30 minutes, patients with sum of SB scores of less than 9/10 were offered a complement block.. Needling time, SB, MB, discomfort, complications and patient satisfaction were evaluated. Blocks were filmed for further needle assessment by two independent evaluators. Demographic data were correlated to block success with a Fisher Exact Test or a Two Sample Test, depending on applicability, with bilateral statistical significance set at p
RESULTS
Mean patients’ BMI was 34.4±4.1 kg/m². Surgical success was obtained in 87.5% (28/32); one patient required complement block and two general anesthesia, including one for unrelated positional discomfort. One technique was not completed due to unfavourable anatomy. Mean needling time was 5.6±3.3 minutes. Needle visibility, evaluated on a five-point Likert scale was good for needle tip (3.0±0.9) and shaft (3.7±0.9). Excluding the uncompleted technique, 28/31 patients had SB≥9/10 and 26/29 patients had MB≥9/10 (two patients had casts limiting evaluation). Two transient paresthesias, one vascular puncture and no late complications were recorded. The procedure was well tolerated with mean discomfort score of 2.5±1.8 on a Visual Analogue Scale (VAS) and good satisfaction at 48h (9.3±1.4, VAS). No correlation between BMI and block success was found.

CONCLUSION
Retroclavicular approach for anesthesia of the brachial plexus has a success rate and needling time similar to other approaches described in the literature, even for this obese population. The perpendicular needle-US beam angle theoretically increases needle visibility, which could increase block success and reduce complications. A comparative study with the classic coracoid approach will be necessary to clarify the potential benefits of this novel approach.

References:
1. International Anesthesiology Clinics, 2013 51(3), 90-112
INTRODUCTION
Respiratory depression is a serious perioperative complication associated with morbidity and mortality. Recently, technology has become available to continuously monitor patients on regular surgical wards with pulse oximetry and wireless clinician notification with alarms. When a patient’s SpO2 falls below a set threshold (e.g. 90%), the clinician is notified via a pager and may intervene earlier to prevent further clinical deterioration. To date, no randomized controlled trial (RCT) has evaluated this technology on a regular surgical ward. We conducted a pilot RCT to assess the feasibility of implementing a wireless monitoring system to prevent post-operative respiratory depression in adult post-surgical patients.

METHODS
The trial protocol was approved by the institutional ethics board. The study was conducted on two regular surgical wards at an academic teaching hospital. Adult surgical patients with an expected length of stay of 1 day or more were randomized to standard care or standard care plus wireless respiratory monitoring during this 24-week pilot study. The wireless monitoring notified the patient’s nurse via pager if their SpO2 decreased below 90%. The randomization sequence was computer-generated and allocation managed by a 24-hour call-in center. Blinding was deemed unfeasible given the intervention. Primary outcomes were average patient recruitment per week and tolerability of the monitoring system. Respiratory events were collected as a secondary outcome and this was defined as a composite of naloxone administration for respiratory depression, transfer to ICU, or cardiac arrest team activation. Other secondary outcomes included the number of alarms per week, the type of alarms, and the response to the alarm by the nursing staff. Data were analyzed by intention-to-treat.
RESULTS
The trial enrolled and randomized 250 patients of the 335 screened for eligibility (CONSORT Flowsheet, Figure). Baseline demographics were similar between groups, except for more women in the wireless group compared to standard monitoring (75.8% versus 61.9%, respectively). Average patient recruitment per week was 13.6 (95%CI 12.0-16.2) patients. The wireless monitoring was quite tolerable with 86.6% of patients completing the course of monitoring. With regard to secondary outcomes, the respiratory event rate was low with only 1 event in the wireless group (p=0.50). The average number of alarms per week was 4.0 (95%CI 1.6-6.4). The most common interventions used to resolve the decreased SpO2 were applying oxygen, increasing the FiO2, or encouraging deep breathing and coughing (76.8% of actions).

DISCUSSION
This pilot study demonstrated adequate patient recruitment and high tolerability of the wireless monitoring system. A full RCT that is powered to detect patient important outcomes such as respiratory depression is now underway. Effective interventions to prevent respiratory depression will lead to safer perioperative care and improve patient outcomes.¹

References:
INTRODUCTION

Delirium is a fluctuating disorder that represents a decompensation of cerebral function and can result in acute and reversible cognitive decline. Delirium has been associated with adverse post-operative outcomes, but controversy exists as to whether delirium is an independent predictor of mortality. Our objective was to assess the association between incident post-operative delirium and mortality in adult non-cardiac surgery patients.

METHODS

Ethical approval was not required for this project. The protocol for the systematic review was registered with PROSPERO (CRD42015029805), and was conducted in accordance with the Cochrane Collaboration guidelines. A systematic search of studies was conducted using Cochrane, Medline/PubMed, CINAHL, Embase databases (01/1981 to 09/2015). Eligible studies included randomized controlled trials, cohort studies and case-control studies with validated measures of incident postoperative delirium, and mortality outcomes. Screening was conducted by two independent reviewers. Study design, demographic, exposure and outcome data were extracted. Pooled effect estimates were calculated with random-effects models using Stata 10.0 and expressed as odds ratios (OR) and 95% confidence intervals (95%CI). Heterogeneity was evaluated with the \( I^2 \) index. Risk of bias was assessed using Cochrane Risk of Bias Tool for Non-Randomized Studies.

RESULTS

4626 citations were identified; 38 studies met eligibility criteria, and 28 studies were suitable for pooled analysis (n=6402). Risk of bias in these studies ranged from moderate to high. Primary analysis from observational studies (four studies; orthopedic hip surgery patients; n=1014) that adjusted for a priori defined key confounders (age, gender, comorbidity, previous cognitive impairment and surgery type/urgency) showed that incident post-operative delirium was not associated with a significantly increased risk of mortality after an average follow-up of 31 months (OR= 1.19, 95% CI = 0.95 - 1.49; \( I^2=0.0\% \)). In contrast, post-operative delirium was associated with increased risk of mortality in the secondary analysis using any adjusted estimate (10 studies; n=3085; OR=1.71, 95%CI 1.43 - 2.05; \( I^2=74.8\% \)) and tertiary analysis using
unadjusted event rates (28 studies; n=6402; OR= 4.24, 95%CI 3.56 - 5.06; I²=38.1%).

DISCUSSION
Few high quality studies are available to estimate the impact of incident postoperative delirium on mortality. Studies that controlled for key confounders did not demonstrate a significant independent association of delirium on postoperative mortality. Larger effect sizes noted when confounding bias was present suggest that delirium may be an indicator of underlying factors that pre-dispose a patient to increased risk of death rather than a true independent risk factor. Given the rapid ageing of our surgical population, adequately powered studies using validated exposure metrics, confounder control, and adequate follow up are needed to address the impact of postoperative delirium on mortality.

References:

2. BMJ 2007 334: 842-6
3. JAMA 2010 304: 443-51
143069 - METABOLOMICS PROFILING IN PATIENTS WITH MALIGNANT HYPERTHERMIA (MH)
Primary & Presenting Author: Sheila Riazi, University Health Network, Toronto, Ontario
Co-Authors(s): Natalia Kraeva, Marcin Wasowicz, Jerome Parness
Track: Pharmacology: Basic Science & Clinical

146952 - THE PECTORAL NERVE BLOCK FOR PAIN TREATMENT POST BREAST CANCER SURGERY
Primary & Presenting Author: Pierre Beaulieu, Department of Anesthesiology - Faculty of medicine - Université de Montréal, Montreal, Quebec
Co-Authors(s): Jérôme Cros, Suzan Kaprelian, Patrick Sengès, Caroline Gagnon, Nathalie Nathan
Track: Regional Anesthesia

147077 - EFFECT OF A RECRUITMENT MANEUVER DURING BRAIN TUMOUR RESECTION
Primary & Presenting Author: Alana M. Flexman, University of British Columbia, Vancouver, British Columbia
Co-Authors(s): Peter Gooderham, Ruth Argue, Donald Griesdale, Brian Toyota
Track: Neuroanesthesia

147689 - ANESTHETIC NEUROPROTECTION IN PRE-CLINICAL, CO-MORBID ACUTE STROKE
Primary & Presenting Author: David Archer, The University of Calgary, Cumming School of Medicine, Department of Anesthesia, Calgary, Alberta
Co-Authors(s): Andrew Walker, Ramana Appireddy, Sarah McCann
Track: Neuroanesthesia
151368 - EFFECT OF ANTITHROMBOTIC AGENTS ON SURGICAL TIMING AFTER HIP FRACTURE
Primary & Presenting Author: Michael Baxter, Queen's University School of Medicine, Kingston, Ontario
Co-Authors(s): Janet van Vlymen, Melanie Jaeger, Wilma Hopman
Track: Patient Safety

153555 - EPIDEMIOLOGY OF MATERNAL CARDIAC ARREST IN CANADA: A NATIONWIDE STUDY
Primary & Presenting Author: Mrinalini Balki, University of Toronto, Department of Anesthesia, Toronto, Ontario
Co-Authors(s): Leyla Baghirzada, Juan Andres Leon, Shiliang Liu, Leyla Baghirzada, Juan Andres Leon, Shiliang Liu
Track: Obstetric Anesthesia
INTRODUCTION
The mechanistic details of MH-induced hypermetabolic state are not fully understood. The unknown characteristics of MH-induced hypermetabolism can explain the phenotypic variability among MH patients. We hypothesized that the differences among MHS (anesthetic induced), MHS-NAI (non-anesthetic induced, sensitive to heat and exercise) and MHN (negative) patients are reflected in measurable differences in myoplasmic metabolites. We explored the characteristics of trigger-induced hypermetabolism by measuring metabolomics (metabolite footprint) in these patients' muscle samples during caffeine-halothane contracture test (CHCT).

METHODS
Following local Ethics Committee approval, muscle samples of 27 patients undergoing CHCT for diagnosis of MH (10 MHN, 8 MHS, 9 MHS-NAI) were collected prior and 10 minutes after exposure to 2mM caffeine and 3% halothane. Samples were prepared using the automated MicroLab STAR® system. The extract was divided into 5 fractions: 3 for reverse phase (RP)/UPLC-MS/MS, 1 for HILIC/UPLC-MS/MS, and 1 was reserved for backup. After log transformation, with the minimum observed value for each compound, analysis by two-way ANOVA with repeated measures identified biochemicals that differed significantly \((p \leq 0.05)\) among experimental groups. An estimate of the false discovery rate of \(q\).

RESULTS
Post-treated MHN showed an upregulation of the energy metabolism pathways of glycolysis, TCA cycle and fatty acid beta oxidation. Pretreated MHS-NAI and MHS compared to MHN showed higher levels of glucose and lactose, creatine, creatinine, carnosine and anserine suggesting greater muscle activity. Oxidative and osmotic stress markers (ophthalmate, betaine, and trigonelline) were higher in pretreated MHS-NAI and MHS, compared to MHN. The difference remained significant comparing post treated groups. Pretreated MHS-NAI and MHS groups showed biochemical composition similar to post-treated MHN.

There was significant increase in 3-methylhistidine, 1-methylhistidine, and 1-
methylimidazoleacetate (indices of the muscle protein breakdown) in untreated MHS, MHS-NAI compared to untreated MHN.

Post-treated MHS-NAI showed a partial impairment in glycolysis and pentose phosphate pathways, but relatively preserved fatty acid metabolism. However, post-treated MHS had impairment in all the energy production pathways (see picture).

**CONCLUSION**

Our preliminary results show that muscle of the MHS-NAI and MHS at rest are in a degradation phase and in constant hypermetabolic state. They are unable to further induce protective processes, in response to increased muscle activity post treatment. Furthermore, the impairment of energy production pathways post-treatment (more in MHS than MHS-NAI), resulting in higher levels of oxidative stress markers that can potentially impair mitochondrial function and cause long term effect. The results of this study should be seen as proof-of-concept investigation. Larger sample size is needed not only to create a comprehensive metabolic database to characterize MH state, but also to explore biochemical markers formulating a diagnostic test for MH, perhaps based on less invasive approach (analysis of plasma or urine).

**References:**

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INTRODUCTION
Chronic pain after breast surgery is common, therefore, adequate pain control in the postoperative period is essential. General anesthesia is often associated with a regional technique for breast surgery which consists of thoracic epidural, paravertebral block and the recently described pectoral nerve block (PNB). The first two are not indicated in ambulatory surgery, thus, we decided to evaluate the effectiveness of the PNB in the treatment of postoperative pain after breast cancer surgery.

METHODS
After obtaining two local Ethics Committee approvals, a prospective, randomised, double blind, controlled trial was performed in two international university hospitals between January 2014 and May 2015. The trial was registered to Clinicaltrials.gov. Patients (18-75 yr-old) scheduled for unilateral breast cancer surgery under general anesthesia were recruited, but not those with breast or chronic pain before surgery, metastases or scheduled for breast reconstruction surgery. An echoguided PNB (PECS-1) was performed with 0.4 mL/kg of either bupivacaine 0.25% with adrenaline 1:200 000 or NaCl 0.9% administered between the pectoral muscles at mid-subclavicular level. The primary outcome was pain (verbal numerical rating scale 0-10) in the recovery unit 30 min after admission or when analgesia was requested (pain score > 3/10). Secondary outcome measures were sufentanil consumption (µg) perioperatively and total morphine consumption (mg) in the recovery unit and at 24 h after surgery.

RESULTS
Pain scores and morphine consumption in the recovery were not different between the 2 groups: 3 [1-4] and 3 [1-5], and 1.5 [0-6] and 3 [0-6] for the bupivacaine (n=62; mean age (SD): 59.27 ± 12.21) and placebo (n=65; mean age (SD): 60.71 ± 10.54) groups, respectively. However, for the subgroup of patients (n=29) who underwent major surgery (mastectomies or tumorectomies with axillary clearance) pain scores and morphine consumption were statistically different, 3 [0-4] and 4 [2-5] (P = 0.04), and 1.5 [0-6] and 6 [0-12] (P = 0.016), respectively. Sufentanil peroperatively and morphine consumption at 24 h were not different between the 2 groups, p = 0.90 and 0.65, respectively.

**DISCUSSION**

The PNB (PECS-1) is not necessary for minor breast cancer surgery, however, for major surgery it significantly decreases postoperative pain and morphine consumption in the recovery. A prolongation study looking at pain scores and analgesic consumption between 12-18 months after breast cancer surgery is underway.

**References:**

INTRODUCTION
Patients undergoing neurosurgical procedures are at higher risk of postoperative respiratory failure compared to the broader surgical population. Although alveolar recruitment maneuvers have been advocated as part of a lung protective ventilation strategy during other types of surgery[1], the effect of these maneuvers on the cerebral physiology during elective neurosurgery is not known and may be harmful based on evidence from critically-ill patients.[2] Our primary objective was to determine the effect of an intraoperative alveolar recruitment maneuver on subdural pressure (SDP), a surrogate measure of intracranial pressure, in neurosurgical patients undergoing supratentorial tumour resection. Our secondary objectives were to determine the effect of an intraoperative alveolar recruitment maneuver on 1) surgeon-assessed intraoperative brain relaxation score (BRS) and 2) mean arterial pressure (MAP) and 3) heart rate (HR).

METHODS
This study was conducted following approval from our institutional research ethics board. In this prospective crossover study, patients scheduled for resection of a supratentorial brain tumor were randomized to undergo either a recruitment maneuver of 30 cm of water continuous airway pressure for 30 seconds or a “sham” recruitment maneuver of 5 cm of water for 30 seconds. Following a brief equilibration period of 120 seconds, the patient then underwent the alternative intervention. SDP was measured using a sterile 22g/0.9mm catheter (Introcan Safety®, Braun, Melsungen, Germany) inserted tangentially under the dura.[3] SDP, MAP and HR were recorded continuously throughout the study period and the neurosurgeon, blinded to the treatment group, provided a BRS at baseline and with each intervention. The $\Delta$SDP, $\Delta$MAP, $\Delta$HR and $\Delta$BRS were compared between the 2 treatment groups.
RESULTS
21 patients were recruited and underwent the study procedure. Baseline values were similar between the two treatment groups. The ΔSDP was significantly higher during the recruitment maneuver group compared to the sham maneuver (4.7 vs 0.8 mmHg, p=0.0001). MAP and HR decreased more in the recruitment maneuver group as compared to the sham maneuver (MAP -9.2 vs -0.2 mmHg, pvs +0.8 bpm, p < 0.0001, for the recruitment and sham maneuvers, respectively). Cerebral perfusion pressure was reduced on average by 14 mmHg during the recruitment maneuver. The brain relaxation scores were similar and did not change significantly with either maneuver.

DISCUSSION
Our study presents novel data that recruitment maneuvers increase SDP, reduce MAP and reduce cerebral perfusion pressure in patients undergoing elective supratentorial tumor resection. Although recruitment maneuvers may be beneficial in other types of elective surgery, our results suggest that recruitment maneuvers should be used cautiously in the neurosurgical population.

References:


INTRODUCTION
Acute ischemic stroke is a multifactorial disease – risk factors/predictors include hypertension, diabetes, advanced age, and obesity. Subjects (rats or mice) used in preclinical models of transient focal ischemia are commonly young males; reports of increased ischemic tolerance (neuroprotection) in these normal subjects may not translate to subjects with comorbidities. The purpose of this study was to evaluate published evidence of neuroprotection by anesthetics in preclinical studies involving known comorbidities for stroke.

METHODS
Studies of anesthetic neuroprotection were identified by systematic review of the literature finalized December 15, 2015. A search of the databases Ovid and Embase identified 81 studies of focal cerebral ischemia in rats or mice that reported outcomes in terms of infarct volume, neurological deficit scores or both. From this set (81 studies), we identified four investigations that reported data from independent subgroups that included normal subjects and subjects with comorbidities. Effect sizes were expressed as normalized mean difference (NMD); point estimates for % reduction in neurologic injury by anesthetic exposure were determined by inverse variance weighting meta-analysis using a random effects model. We used a Z-test to compare the mean effect of anesthetic exposure between the subgroups. Meta-analysis and graphics were performed with RevMan 5.3 (www.cc-ims.net/RevMan).

RESULTS
Four studies examined the influence of anesthetic exposure on neurological injury after transient focal ischemia in subjects with comorbid conditions (obesity, high fat diet, diabetes, and old age). The forest plot of effect sizes (Figure) shows that whereas exposure to sevoflurane (3 studies) or isoflurane (1 study) decreased the neurologic injury by 36% (95% C.I. 22-50%) in normal subjects, rats with comorbidities did not experience neuroprotection (Z=3.13, P=0.002). The meta-analysis showed consistency of results within each subgroup (Tau²=0.00), even though the comorbidity was different in each study. Comorbidity presence changed the average infarct volume in control subjects from 30% to 45% of the hemisphere (t=-0.982, P=0.364). In the larger study set (n=81), the control infarct volume was not a significant covariant (P=0.08) in meta-regression against neuroprotective effect size.
CONCLUSIONS
Neuroprotective effects of isoflurane and sevoflurane, which are clearly present in normal animals cannot be extended to subjects with comorbidities. The consistency of the findings within each subgroup is surprisingly good. Although there is a suggestion that comorbidities may have enhanced the injury induced by transient ischemia, the non-significance of control infarct volume against neuroprotective effect size in the large study set indicates that injury severity in control subjects did not influence the degree of neuroprotection observed. Instead, findings suggest that either anesthetic action or the pathophysiology of ischemia or both are different in the subjects with comorbidities.

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INTRODUCTION
Numerous studies have shown that patients with acute hip fractures suffer increased morbidity and mortality if their surgery occurs longer than 48 hours after presentation to the Emergency Department (ED). Managing patients using anticoagulant and antiplatelet medications may result in delays for surgery following hip fractures. However, there is sparse evidence in the literature delineating reasons for surgical delays and outcomes, despite a rising number of our elderly patients taking these medications.

Methods: Following institutional ethics board approval, a retrospective chart review was conducted on 427 consecutive patients presenting to the ED with suspected hip fracture at a tertiary care teaching hospital between January 2014 and November 2015; of these, 394 had a primary presentation of hip fracture and were managed operatively. Information was collected regarding patient demographics, medications, comorbidities, perioperative investigations and management, operative and anesthetic details, and acute length of stay (LOS). Multivariate linear regression analysis was used to determine the contribution of individual factors to two primary outcomes: time to surgery (TTS) and acute LOS.

RESULTS
Prior to ED presentation, 25% (99/394) of patients were taking warfarin (41/394), a novel oral anticoagulant (NOAC) (20/394) or non-ASA antiplatelet medication (38/394). Mean TTS from ED presentation for all participants was 34.5 hours. Surgery was delayed more than 48 hours in 21% (84/394) of patients, while an additional 20% (80/394) had surgery between 36 and 48 hours. Patients on warfarin and NOACs had a longer TTS compared to those not on an anticoagulant (46.1h and 43.2h vs 32.5h) (Table 1). Patients taking non-ASA antiplatelet agents did not have a significant increase in TTS. Multivariate analysis revealed a significant association between increased TTS and warfarin use (8.0h longer, 95% CI 1.4-14.6, p=0.017). However, the increased TTS did not maintain significance on multivariate analysis for NOACs (7.3h longer, -1.5-16.2, p=0.077), likely due to the small numbers. Mean acute LOS for all participants was 8.5 days. The need for a postoperative transfusion was associated with an increased acute LOS on regression analysis. Preoperative warfarin reversal
patterns showed uniform usage of an initial Vitamin K dose but variable use of prothrombin complex concentrates, plasma, and additional Vitamin K.

**DISCUSSION**
In this retrospective review, patients taking warfarin preoperatively were shown to have increased TTS. Despite recognized guidelines detailing timely INR reversal protocols, those taking warfarin still experienced significant delays. Interestingly, those patients on NOACs did not wait longer than those on warfarin, even though there is no optimal reversal agent. There is opportunity to improve our management of warfarin reversal to minimize delays in TTS and subsequent increased morbidity and mortality.

**References:**

153555- EPIDEMIOLOGY OF MATERNAL CARDIAC ARREST IN CANADA: A NATIONWIDE STUDY

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INTRODUCTION
Cardiac arrest during pregnancy is a rare event with an estimated incidence of 1:30,000 to 1:50,000 deliveries. Such events can be catastrophic, leading to a significant potential for major morbidity and mortality for the mother and the neonate. The maternal and neonatal case fatality rates have been reported to be 83% and 58%, respectively.

OBJECTIVES
The objective of this study was to generate information about maternal cardiac arrest in Canada by examining the frequency, temporal incidence, associated conditions, maternal survival and fatality rates.

METHODS
This retrospective cohort study was conducted after institutional Research Ethics Board approval. It was based on the hospitalization database for childbirth in Canada (except Quebec) for 12 fiscal years from 2002/03 to 2013/14. The database is housed at the Public Health Agency of Canada (PHAC), prepared under strict confidentiality guidelines by Canadian Institute for Health Information (CIHI). The study population was all women with gestational age 20 weeks and higher with cardiac arrest during hospitalization for childbirth. Cardiac arrest was defined based on ICD-10-CA diagnostic (I46.0, I46.1, I46.9, I49.00, I49.01) and intervention codes (1.HZ.30.^, 1.HZ.09.JA-FS, 1.HZ.09.LA-FS, 1.HZ.09.LA-CJ). The study population and maternal mortality rate were summarized using descriptive statistics. Multivariable logistic regression analysis was used to identify medical and obstetrical conditions independently associated with maternal cardiac arrest.
RESULTS
There were 261 cases of maternal cardiac arrest among 3,282,150 hospitalizations for delivery. The records included about 70% of all obstetric deliveries in Canada. 185 women survived to hospital discharge (70.9%, 95% confidence interval [CI] 65.2% to 76.2%). The fatality rate was 28.8%. The frequency of cardiac arrest in 2002-2014 varied from 5 to 11 per 100,000 deliveries; there was no significant difference between the years (p=0.26). There was no significant variation in the incidence among Canadian provinces (p=0.42). Women who suffered cardiac arrest were more likely to be 35 yr and older (odds ratio 2.34; 95% CI 1.69 to 3.26). Aortic aneurysm and dissection was the most common condition associated with maternal cardiac arrest, followed by obstetric embolism and heart failure. Table 1 lists statistically significant associations between maternal obstetric/ medical conditions, and cardiac arrest.

DISCUSSION
This is the first Canadian population based cohort study on the epidemiology of maternal cardiac arrest. The event rate is 8:100,000, and agrees with that reported in the US cohort. Survival rate reported in this study is higher than previously reported, potentially owing to the differences in case identification between the studies, using the population database and those relying on active surveillance. The information from this report could be used to develop prospective database of the cases and guide development of the system approach in dealing with this condition.

References:

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