POSTER DISPLAY 1
Saturday June 22
09:45 – 16:00
Exhibition Hall C/D/X

EXPOSITION DES AFFICHES 1
Samedi 22 juin
9 h 45 à 16 h
Salle d'exposition C/D/X

1610508 - POSITIVE-PRESSURE VENTILATION DURING TRANSPORT: A RANDOMIZED CROSSOVER STUDY OF SELF-INFLATING AND FLOW-INFLATING RESUSCITATORS
Presenter: Malcolm Lucy, Anesthesia, University of Saskatchewan, Saskatoon, SK
Co-author: Jonathan Gamble

1628001 - LAPAROSCOPIC SURGERY IN A PATIENT WITH FONTAN CIRCULATION & LIVER CIRRHOSIS
Presenter: Colin Phillips, Western University, London, ON
Co-author: Achal Dhir

1640582 - CALIBRATION AND EVALUATION OF A NOVEL LOW-COST PULSE OXIMETER SENSOR
Presenter: Heng Gan, Anesthesia, Pharmacology & Therapeutics, University of British Columbia, Vancouver, BC
Co-authors: Christian Petersen, Martin J MacInnis, Guy Dumont, Mark Ansermino

1641690 - METHYLENE BLUE AIDS IN MANAGEMENT OF CENTRAL VENOUS PERFORATION
Presenter: Alexandra Florea, Anesthesiology and Perioperative Medicine, Queen's University, Kingston, ON
Co-author: David Mark

1646015 - USABILITY EVALUATION OF A DUAL CLOSED-LOOP ANESTHESIA SYSTEM
Presenter: Nicholas West, Anesthesia, Pharmacology and Therapeutics, University of British Columbia, Vancouver, BC
Co-authors: Guy Dumont, Sara Khosravi, Kousha Talebian, Christian Petersen, Richard Merchant, Mark Ansermino

1646454 - EFFECT OF MENTAL PRACTICE ON TRAUMA TEAM PERFORMANCE--A SIMULATION BASED STUDY
Presenter: Zoe Unger, Anesthesia, University of Toronto, Toronto, ON
Co-authors: Christopher Hicks, Sana Ahmed, Megan Hayter

1646515 - USE OF POINT OF CARE ULTRASOUND (POCUS) OF THE INFERIOR VENA CAVA IN THE PERIOPERATIVE MANAGEMENT OF A LIFE THREATENING PULMONARY EMBOLUS
Presenter: Moein Tavakkoli zadeh, Anesthesia, Sunnybrook Hospital, Toronto, ON
Co-authors: Jing J Wang, Catherine Nix, Edgar Hockmann

1647017 - AWAKE VIDEOLARYNGOSCOPIC INTUBATION IN A PATIENT WITH A PENETRATING NECK INJURY.
Presenter: Derek Dillane Department of Anesthesiology and Pain Medicine, University of Alberta, Edmonton, AB
Co-authors: Andrea Kreitz, David Williams, Michael Murphy

1647510 - TEE: WHEN SEEING BEYOND THE HEART
Presenter: Marie-Jo Plamondon, Anesthesiology, University of Ottawa/The Ottawa Hospital, Ottawa, ON
Co-authors: Ashraf Fayad, Desiree A Persaud

1652096 - ANESTHESIA INFORMATION MANAGEMENT SYSTEM USE IN CANADA
Presenter: Jadon Harding, Anesthesiology, Memorial University of Newfoundland, St. John's, NF
Co-author: Steven Howells

1652139 - SAFETY IV CATHETERS AND THE PEDIATRIC ANESTHESIOLOGIST
Presenter: Kimmo Murto, Anesthesiology, Children's Hospital of Eastern Ontario, Ottawa, ON
Co-authors: Sophie Breton, Kelly-Ann Ramakko, Robert Perverseff, Gregory L Bryson
1652175 - FATTY EMULSION: SURVIVING CLONIDINE & PROPRANOLOL OVERDOSE
Presenter: Kimberly Macala, Discipline of Anesthesia, Memorial University of Newfoundland, St. John's, NF
Co-authors: Natalie Bandrauk, Andrew Smith

1652518 - A NOVEL EXTUBATION WITH LMA & EXCHANGE CATHETER IN A DIFFICULT AIRWAY
Presenter: Raviraj Raveendran, Anesthesia Department, Toronto Western Hospital, University of Toronto, Toronto, ON
Co-authors: Sunita G Sastry, David T Wong

1652825 - GLIDESCOPE-ASSISTED BRONCHOSCOPIC INTUBATION WITH AINTREE CATHETER
Presenter: Leng Zoo Tan, Toronto General Hospital, Toronto, ON
Co-author: Richard Cooper

1653126 - A SURVEY ON THE USE OF COMBINED SPINAL-EPIDURALS IN OBSTETRICS BY ANAESTHETIC TRAINEES
Presenter: Jonathan Yen, Anesthesia, The Ottawa Hospital, Ottawa, ON
Co-authors: Jason Cronje, Liang Wee

1653534 - EXPANDING NECK MASS UNDER GENERAL ANESTHESIA.
Presenter: Michael Vargo, Anesthesia, Dalhousie University, Halifax, NS
Co-authors: Edmund Tan, Christian Lehmann

1653602 - AN INFUSION RATE MONITOR FOR USE IN INTRAVENOUS THERAPY
Presenter: Cody Robson, Faculty of Applied Science, University of British Columbia, New Westminster, BC
Co-authors: Richard N Merchant, Joel Wiedman, Ryan Yee

1653610 - DES MODEL OF OR EFFICIENCY COMPARING TWO NMB REVERSAL AGENTS
Presenter: Alexandra Goyette, Merck Canada Inc., Kirkland, QC
Co-authors: André Jacques, Andre Galarneau, Ralph Insinga, Eric M Maiese, Susan Grant

1653710 - INSTRUCTIONAL VS WITHIN-TEAM LED DEBRIEFINGS: A QUALITATIVE ANALYSIS
Presenter: Sylvain Boet, Anesthesiology, The Ottawa Hospital, University of Ottawa, Ottawa, ON
Co-authors: Ashlee-Ann Pigford, Amber Fitzsimmons, Scott Reeves, Emmanuel Tribi, Dylan Bould

1653720 - THE IMPACT OF SIMULATION-BASED CRISIS RESOURCE MANAGEMENT TRAINING: A SYSTEMATIC REVIEW
Presenter: Lillia Fung, Anesthesiology, The Ottawa Hospital, University of Ottawa, Ottawa, ON
Co-authors: Sylvain Boet, Haytham Qosa, Walter T Tavares, Laure Perrier, Andrea Tricco, Scott Reeves, Dylan Bould
Introduction: The provision of positive pressure ventilation during transport of the intubated patient is generally delivered via a hand pressurized positive pressure device. Of these devices, self-inflating and flow inflating resuscitators constitute the two major types widely in use. Selection of a particular resuscitation device for transport, however, lacks proper evidence and largely remains an institutional practice.

Methods: We compared the ventilatory performance of a self-inflating resuscitator as compared to a flow-inflating resuscitator with respect to the administration of positive-pressure ventilation in a randomized crossover simulation study. Local research ethics board approval was obtained prior to study commencement. Subject recruitment included a voluntarily selected convenience sample of anesthesiology residents, staff and anesthesia assistants (AAs) currently holding positions within our department. Exclusion criteria included an inability to hand ventilate using one or both resuscitation devices. A model test lung (Michigan Instruments Test Lung Model #5601i) was employed as both the patient model and measurement device. Subjects were required to hand ventilate the test lung while simultaneously maneuvering a stretcher bed for a period of 8 minutes to simulate patient transport. Hand ventilation was carried out using a Jackson-Rees circuit (Flow-inflating type) and a Laerdal pediatric silicone resuscitator (Self-inflating type) in a crossover fashion. Participants were randomized with respect to starting device. A clinical vignette was provided to instruct each participant to ventilate the test lung according to the following respiratory parameters: peak inflation pressure (PIP) 30 cm H2O, positive end-expiratory pressure (PEEP) 10 cm H2O, Respiratory Rate (RR) 20. Data collected included PIP, PEEP, tidal volume and RR. The primary outcome measure included total proportion of breaths delivered within the predefined PIP/PEEP range (30 +/- 3/10 +/- 3 cm H2O). Secondary outcome measures included total proportion of breaths outside of an operationally defined unacceptable PIP/PEEP range (>35/<5), following published recommendations (*see reference), as well as average minute ventilation.

Results: See Table 1 for results.

Discussion: Mechanical hand ventilation during patient conveyance using a flow-inflating resuscitator as compared to a self-inflating resuscitator demonstrates significantly greater achievement of target ventilatory parameters as well as a lower incidence of unacceptable ventilatory pressures.


Table 1: Comparison of tidal breath delivery between flow-inflating and self-inflating resuscitators

<table>
<thead>
<tr>
<th>Proportion Delivered Breaths within Target Ventilatory Parameters</th>
<th>Flow-Inflating (Breaths)</th>
<th>Self-Inflating (Breaths)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All N=30</td>
<td>1869/3615 (51.7%)</td>
<td>444/3421 (13.0%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Staff N=11</td>
<td>696/1197 (58.1%)</td>
<td>141/1200 (11.8%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Resident N=14</td>
<td>871/1797 (48.5%)</td>
<td>145/1665 (8.7%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>AA N=5</td>
<td>302/621 (48.6%)</td>
<td>158/556 (28.4%)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proportion Delivered Breaths with Unacceptable Ventilatory Parameters</th>
<th>Flow-Inflating (Breaths)</th>
<th>Self-Inflating (Breaths)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All N=30</td>
<td>448/3615 (12.4%)</td>
<td>2055/3421 (60.1%)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Group</td>
<td>N</td>
<td>Denominator 1 (Rate)</td>
<td>Denominator 2 (Rate)</td>
</tr>
<tr>
<td>--------</td>
<td>-----</td>
<td>----------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Staff</td>
<td>11</td>
<td>210/1197 (17.5%)</td>
<td>718/1200 (59.8%)</td>
</tr>
<tr>
<td>Resident</td>
<td>14</td>
<td>169/1797 (9.4%)</td>
<td>1080/1665 (64.9%)</td>
</tr>
<tr>
<td>AA</td>
<td>5</td>
<td>69/621 (11.1%)</td>
<td>257/556 (46.2%)</td>
</tr>
</tbody>
</table>
LAPAROSCOPIC SURGERY IN A PATIENT WITH FONTAN CIRCULATION & LIVER CIRRHOSIS

Colin Phillips¹, Achal Dhir²

1. Western University, London, ON, Canada
2. London Health Sciences, LONDON, ON, Canada

**Purpose:** We explore the physiological effects of Fontan circulation in the setting of an individual with a repaired congenital heart defect and liver cirrhosis. In Fontan circulation, systemic venous blood is directed into the pulmonary circulation bypassing the right ventricle. Patients can develop end organ dysfunction from chronic elevation of venous pressure and poor cardiac output. Determinants of successful Fontan physiology include the transpulmonary gradient, systemic venous pressure, pulmonary vascular resistance, AV valve function, cardiac rhythm, and ventricular function. The effects of laparoscopic surgery are reviewed in relation to the cardiorespiratory goals of our patient. With the concurrent use of transesophageal echocardiography (TEE), we provide a real time assessment of volume status and cardiac output. A literature search will be performed to review current management strategies in this patient population.

**Clinical Features:** Patient consent was obtained prior to surgery. He was seen in a pre-admission clinic before surgery for optimization. Pre-operative evaluation included an echocardiogram, which confirmed anatomy consistent with Fontan circulation. The patient had a previous laparoscopic surgery for appendicitis, which did result in an ICU admission for heart failure. The patient was brought to the operating room for surgery. A so called cardiac induction was performed, in which fentanyl and midazolam were used with a decreased target dose of propofol. After intubation, a TEE probe was introduced and used throughout the case. The radial artery was cannulated for invasive blood pressure monitoring and to allow frequent blood gas analysis. The surgeons were asked to maintain a lower pressure for the pneumopertioneum to aid in venous return. At the end of the case, the patient was successfully extubated and brought to recovery.

**Conclusion:** The patient successfully underwent a laparoscopic cholecystectomy. Intraoperative TEE was performed, and used to assess global heart function. Use of pressors was required several times for hemodynamic support. He was monitored in the recovery unit, and spent one night in hospital without incident. Current literature on Fontan circulation was reviewed, with emphasis on TEE evaluation.
Introduction: Pulse oximetry is vital for patient safety during anesthesia, yet remains worryingly unaffordable in low-resource countries. Mobile phones are widely available even in rural areas of the world. A novel low-cost pulse oximeter sensor, the AudioOx, interfaces directly with the audio channel of the mobile phone, using the audio output to power the sensor, the microphone input to record the plethysmographic signal, the phone processor to interpret the plethysmographic data, and the phone display to report the resultant oxygen saturation (SpO\(_2\)) measurements. We calibrated and evaluated the AudioOx for accuracy, using two commercially available pulse oximeters as references.

Methods: With approval from the Research Ethics Board and Health Canada (and individual informed consent), oximetry data were collected in an observational study of healthy adult volunteers. Subjects were participants in an unrelated study that required them to remain overnight in a hypoxia chamber (ambient oxygen 12-21%). Subjects were fitted with three different pulse oximeters: a Nonin Xpod, a Masimo OEM module and the AudioOx. Subjects and investigators were blinded to the measurements from the three sensors during data collection. The AudioOx was initially calibrated to concurrent SpO\(_2\) readings from the Nonin Xpod. Subsequent AudioOx measurements were then compared to concurrent SpO\(_2\) readings from the Nonin Xpod and the Masimo OEM module. Root mean square accuracy (A\(_{RMS}\)) and mean bias were calculated per the International Organization for Standardization [1].

Results: Pulse oximetry data were recorded from nine subjects, with SpO\(_2\) values ranging from 70% to 100%. Data from the first two subjects were used for calibration, and data from the subsequent seven subjects for evaluation. With reference to the Nonin Xpod, the AudioOx had a 2.47% A\(_{RMS}\) with a 0.70% mean bias (standard deviation 2.37%). With reference to the Masimo OEM module, the AudioOx had a 4.34% A\(_{RMS}\) with a -1.75% mean bias (standard deviation 3.71%).

Discussion: We have shown that the audio channel of a mobile phone can be used as an interface for a pulse oximeter finger sensor, effectively reducing the cost of pulse oximetry to that of the sensor itself. The simplicity and low cost of the AudioOx and its close correlation to reference SpO\(_2\) measurements promises an exciting new solution for disseminating pulse oximetry and improving perioperative patient safety in low-resource countries. Further evaluation, using blood gas analysis as reference, is planned.

1641690 - METHYLENE BLUE AIDS IN MANAGEMENT OF CENTRAL VENOUS PERFORATION

Alexandra Florea¹, David Mark¹
1. Anesthesiology and Perioperative Medicine, Queen’s University, Kingston, ON, Canada

Purpose: Vessel perforation by a central venous catheter can be life-threatening. This report illustrates a case of central venous catheter perforation identified during emergency surgery and the use of methylene blue as a decision aid in a critical situation.

Clinical Features: REB approval and written consent by the patient were granted for publication of this report. A 62 year old female developed a right hemothorax, uncontrolled internal bleeding and hemodynamic instability one day after undergoing exploratory sternotomy. While being resuscitated she was emergently transferred to the operating room for a second exploratory sternotomy. She arrived with a right internal jugular (RIJ) central line, a right brachial PICC line which was infected and not to be used, and venous pacer wires in her left IJ line. The RIJ line was her sole venous access through which blood and vasopressors were infused with good response. The surgical team identified the source of bleeding as a superior vena cava perforation by an indwelling venous catheter. Although the RIJ line seemed the likely culprit, it was not immediately possible to know which of the three central catheters was responsible, and the team was reluctant to remove the RIJ catheter without certainty of its corruption. Methylene blue was injected through the RIJ catheter and the dye was visualized by the surgeons exiting its tip into the patient’s chest. A new femoral venous central line was established and the offending catheter was removed. The patient survived this critical event and was eventually discharged from hospital. Perforation or erosion of central venous catheters occurs in 0.4-0.5% of catheter placements.¹,² Perforation can occur immediately during cannulation, but has been reported up to 60 days after placement.² Factors increasing the risk for vascular erosion are left-sided placement, large or multiple lumen catheters (14 gauge or larger), an incidence angle of catheter tip to SVC of 40° or greater and stiff catheters or those with very mobile tips.¹,³ This case report illustrates a novel use of methylene blue as an indicator dye in the direct visualization of central catheter perforation. Methylene blue was chosen due to its relative safety, potential benefit from inducible nitric oxide synthase inhibition, and immediate availability in the operating room. Other dyes such as isosulfan or patent blue are less readily available and have a higher risk of allergy.⁴ Propofol is also easily visualized, but was unacceptable due to the severe hemodynamic instability of the patient.

Conclusion: We describe a case of a successful resuscitation and surgical treatment for central line erosion presenting with hemorrhagic shock. The use of methylene blue to identify the culprit catheter was an important tool that contributed to the efficient management of this life-threatening event.

4. Surg Oncol 2011 e55-e59
1646015 - USABILITY EVALUATION OF A DUAL CLOSED-LOOP ANESTHESIA SYSTEM

Nicholas West¹, Guy Dumont², Sara Khosravi², Kousha Talebian², Christian Petersen¹, Richard Merchant¹, Mark Ansermino¹

1. Anesthesia, Pharmacology and Therapeutics, University of British Columbia, Vancouver, BC, Canada.
2. Electrical and Computer Engineering, University of British Columbia, Vancouver, BC, Canada.

Introduction: iControl v3 is a system for closed-loop control of propofol and remifentanil anesthesia in adults. It includes a touch-screen user interface, the NeuroSENSE EEG monitor, two Alaris infusion devices and speakers for audible alarms. Previous versions of the system have been clinically evaluated [1]. The system has been designed for investigational use, with patient safety as a key priority. The aim of this study was to evaluate the system’s usability in the hands of expert users. The purpose of this formative evaluation was to guide development of the user interface, verify appropriate configuration of devices and demonstrate that the system can provide a safe and acceptable interface for the clinical evaluation. Results of the study will further inform risk identification, formulation of Instructions for Use (IFU) and design of the training scheme [2].

Methods: Institutional review board approval and informed consent were obtained to conduct the evaluation with staff from the Department of Anesthesia. All participants were given an introduction to the system and were asked to ‘think aloud’ during the evaluation, while their comments were captured with a voice recorder [3]. After a brief opportunity to use the equipment without instruction, a structured evaluation was conducted, in which participants followed a specific set of verbal prompts for 18 safety-critical tasks and 12 administrative tasks. Each participant provided post-test verbal feedback and completed the Computer System Usability Questionnaire (CSUQ) [4], in which positive statements about the system were scored on a scale of 1 (strongly agree) to 7 (strongly disagree).

Results: Usability was evaluated by 15 potential users (12 staff anesthesiologists, 2 residents and 1 anesthesia assistant), all reporting normal or corrected-to-normal vision. Twenty-three usability issues were observed and/or reported by participants. These related to confirmation of data input (n=6), understanding displayed information (n=4), use of the touch screen interface (n=3), identification and interpretation of error messages (n=3), operation of infusion devices (n=3), organisation of lists and graphical information (n=3) and the log-in/-out process (n=1). These issues suggested improvements to the IFU and/or focus points for training; 2 issues were resolved by modifying peripheral equipment and 4 issues prompted minor software changes to the user interface. Participants completed all evaluation tasks: 17/18 safety-critical tasks and 9/12 administrative tasks were completed by more than 90% of participants without assistance; however, for one safety critical-task (identify an infusion rate), 23% of participants needed assistance. The CSUQ (median score 3, inter-quartile range 2-4) suggested the system met user expectations.

Discussion: After only a brief informal introduction, representatives of the target user group were able to safely operate the system with minimal assistance. Solutions were provided for the identified usability issues and additional requirements were recorded for consideration in future releases. The system and IFU will be subjected to a summative evaluation prior to the start of clinical testing to verify that identified solutions are effective.

Introduction: Mental practice (MP), or the symbolic rehearsal of physical activity in the absence of gross muscular movement, has been used in sports and music to enhance performance. In healthcare, warm-up using MP has been demonstrated to improve technical skill performance in surgeons. The effect of warm-up using MP on team performance, however, remains unknown. This study aims to determine whether warm-up using MP based on an Advanced Trauma Life Support (ATLS) script results in improved team performance during a simulated trauma scenario.

Methods: Following REB approval and informed consent, forty trauma teams were recruited. Each team consisted of an anesthesia resident and either a general surgery or an emergency medicine resident and a confederate nurse. Each trauma team was randomized to either the intervention group or the control group. The intervention group participated in 10 minutes of MP. Specifically, it rehearsed a MP script, which highlighted key technical elements of ATLS. The control group had a 10-minute didactic session on a topic unrelated to trauma resuscitation. Subsequently each group managed a high-fidelity, videotaped, simulated trauma resuscitation. Using the validated Mayo High Performance Teamwork scale, the Ottawa CRM Global Rating Scale (GRS), and the Anesthetists’ Non-Technical Skills (ANTS) scale, three independent, blinded raters evaluated each videotaped team performance. A Mann-Whitney test was used to compare the performances between the two groups.

Results: We have currently completed our data collection and reached our target of 40 simulation scenarios. The primary outcome is the effect of MP on the behavioral performance of trauma team members both as a team and as individuals. The performance of the anesthesia residents was assessed with the ANTS scale and the performance of the surgery residents was assessed with the Ottawa CRM GRS. Overall team performance was assessed with the Mayo High Performance Teamwork Scale. The secondary outcome is the effect of MP on the participants’ perceptions of their performance as measured by the previously validated Mental Imagery Questionnaire (MIQ). The recorded scenarios are currently under analysis with results pending. If accepted, the results will be presented at the 2013 Canadian Anesthesia Society Meeting.

Discussion: MP is an inexpensive, easily implementable educational tool that has been demonstrated to improve surgeons’ technical skill performance. MP may also prove to be an effective warm-up tool prior to team performance.

USE OF POINT OF CARE ULTRASOUND (POCUS) OF THE INFERIOR VENA CAVA IN THE
PERIOPERATIVE MANAGEMENT OF A LIFE THREATENING PULMONARY EMBOLUS

Moein Tavakkoli zadeh¹, Jing J. Wang¹, Catherine Nix¹, Edgar Hockmann¹

1. Anesthesia, Sunnybrook hospital, Toronto, ON, Canada

Purpose: Studies using intraoperative trans-esophageal echocardiography (TEE) have observed the presence of multiple emboli during long bone surgery, especially during reaming or cementing. However, emboli imaged were rarely associated with hemodynamic instability. We describe the perioperative use of point of care ultrasound examination of the inferior Vena-Cava (IVC) to identify pulmonary emboli (PE) associated with significant cardiovascular collapse.

Clinical Features: A 58 year-old caucasian woman with a pathological fracture of right femur underwent insertion of an intramedullary nail. She was diagnosed with non-small cell carcinoma of the lung 2 years prior, and was treated for brain and bone metastases. Her platelet count and INR were normal. Standard ASA monitoring was applied and supplemental oxygen via a face-mask was started. An ultrasound-guided fascia iliaca block with 35ml of 0.375% bupivacaine, and a spinal anesthetic with 2.6ml of plain 0.5% bupivacaine and 10mcg of fentanyl were administered uneventfully. Moderate sedation was achieved with propofol infusion. Intraoperative hemodynamics remained stable until the wound closure, at which time the patient became unresponsive with an unrecordable blood pressure and a sudden drop in end-tidal Carbon Dioxide and Oxygen saturation accompanied with tachypnea. Following resuscitation with ephedrine (50mg), phenylephrine (400mcg) and 1.5L crystalloid, trans-abdominal ultrasound examination of the IVC showed multiple emboli in the IVC measuring 2-4 mm. Subsequent TTE - performed immediately by a second anesthesiologist- demonstrated normovolemic heart chambers with normal valve function and wall motion. This was associated with return of normal circulation. Due to concerns for pulmonary embolus, unfractionated heparin was administered, as was IV steroids given her history of IV contrast hypersensitivity. Interestingly, CT-PA performed 11 hours post-op did not identify any PE, so in consultation with the medical team only prophylactic anticoagulation was commenced. The patient made full recovery and was discharged home two days later. The patient's consent was obtained.

Conclusion: Numerous studies have detailed the benefits of perioperative TEE for the detection of PE; however, its availability is limited by its cost and the expertise required. Point of care TTE of the inferior vena cava to assess fluid responsiveness has become common practice at our institution. Its intraoperative use is less invasive than TEE and the skills required for diagnosis are easily acquired. Indeed, since the prediction by the Symington report that point of care ultrasound will change how medicine is practiced and taught, PoCUS has become part of the medical curricula worldwide to various degrees. Furthermore, we highlight the possibility that previously reported incidence of intraoperative PE may be an underestimation as they relied on postmortem examination to confirm the embolus. Our case demonstrates that hemodynamically significant PE can occur transiently without subsequent physical evidence. The increasing availability of portable ultrasound and skill in its use of during the perioperative period has enabled us to make this prompt bedside diagnosis and target therapy in a timely fashion.

Crit Ultrasound J. 2011 Apr;3(1):1-12
Purpose: Awake videolaryngoscopic intubation for patients with a penetrating neck injury (PNI) may improve patient safety and first pass intubation rate while maintaining cervical spine precautions.

Clinical Features: Patient consent was obtained. A 49 year old, ASA 2E male presented in the ED with a penetrating neck injury secondary to a gun shot wound. He was fully conscious, hemodynamically stable and tachypneic. A single penetrating Zone II neck injury was found to the right of the midline with suspected vascular involvement (Figure 1). An exit wound was visible over the right trapezius muscle. Manual pressure was applied to the entry wound to contain a rapidly developing hematoma and associated tracheal midline shift. Intubation was indicated to maintain a patent airway and to allow for immediate surgical exploration. Airway examination revealed a Mallampati 2 score. A more elaborate airway examination was precluded by the presence of a cervical collar. Awake videolaryngoscopic intubation was deemed to be the safest technique to secure this potentially challenging airway in a deteriorating patient. Sedation was not administered for intubation. Topicalization was performed using 5% lidocaine gel to the posterior aspect of the tongue and 2% lidocaine spray to the tonsillar fossae. A Cormack and Lehane grade II view of the glottis was achieved with a GlideScope video laryngoscope (Verathon Inc, Bothell, WA, USA) while manual cervical spine in-line stabilization was maintained. Significant edema of the arytenoid cartilages and aryepiglottic folds was observed. The vocal cords were topicalized with 2% lidocaine spray. A cuffed endotracheal tube was passed without difficulty over a rigid stylet. Intubation was well tolerated and spontaneous respiration was maintained. During surgical exploration, an injury to the mid portion of the right internal jugular vein was discovered and the jugular vein was ligated proximally and distally.

Conclusion: Current guidelines suggest that orotracheal intubation with direct laryngoscopy is the recommended method for emergency tracheal intubation following trauma (1). Awake videolaryngoscopy may offer a number of advantages including superior views of the glottis, a higher intubation success rate and reduced cervical spine motion while maintaining spontaneous ventilation in a conscious patient.

References: J Trauma Acute Care Surg 2012 73 S333-340
Purpose: To understand the importance of transesophageal echocardiography (TEE) in guiding the differential diagnosis and management of a post-operative hemodynamically unstable patient.

Clinical Features: A case of unsuspected splenic artery perforation and splenic injury in an endovascular thoraco-abdominal aneurysm (TAA) repair: An 84 yo M with a 6.6 x 6.6cm TAA underwent an uncomplicated elective endovascular repair. Post-extubation he became tachycardic and hypotensive. The differential diagnosis was broad (bleeding, myocardial injury, congestive heart failure, pneumothorax, pulmonary embolism, etc.) but the most likely diagnosis was an acute intra-abdominal bleed. The suspected culprit was either a worsening endoleak or a ruptured R iliac artery. It was decided to perform an angiogram, but the patient kept on deteriorating and became too unstable to proceed. He was re-anesthetised and the transesophageal probe was advanced into his stomach to examine the newly placed graft. To our surprise, a large perisplenic hematoma was discovered as well as new antero-septal wall motion abnormalities. Given these findings, the surgical team was prompted to explore the perisplenic area. They discovered a punctured splenic artery and a lacerated spleen, confirming the source of exsanguination. The patient required an emergent splenectomy, was stabilized and transferred to the ICU.

Conclusion: The TEE not only helped us with hemodynamic monitoring and management of the patient’s ischemic insult but more importantly it helped us guide the surgeons as to where the most likely source of bleeding was. With the increasing practice of ultrasonography in medicine, TEE will undoubtedly become commonly used by anaesthesiologists in the non-cardiac ORs. It was previously reported that the use of TEE in the non-cardiac ORs or in the ICU may alter medical therapy in 30% of cases (1). Additionally, TEE may help diagnose unsuspected pathology especially in the context of cardiovascular collapse or refractory hypotension. However, for comprehensive TEE examination, splenic examination is not part of the 20 recommended cross-sectional views (2). Therefore, unless a pathology is suspected, the perisplenic space is not routinely examined. The finding in our case was unanticipated and it is apparent that the TEE became more than a heart assessment tool. It allowed us not only to improve our intra-operative management but also to see beyond the heart.

2. Journal of the American Society of Echocardiography Volume 12 Number 10:884-900
1652096 - ANESTHESIA INFORMATION MANAGEMENT SYSTEM USE IN CANADA

Jadon Harding¹, Steven Howells¹

1. Anesthesiology, Memorial University of Newfoundland, St. John's, NF, Canada

Introduction: There is little published data on the use of anesthesia information management systems (AIMS) in Canada. A survey was undertaken among English-speaking Canadian academic anesthesiology departments to determine current use of AIMS and attitudes and factors affecting their adoption.

Methods: In December 2011, after receiving ethics review committee approval, an Internet survey (SurveyMonkey) was e-mailed to forty (40) English Canadian university affiliated site chief. Contact information for site chiefs was obtained from the Association of Canadian University Departments of Anesthesia. Each site was given six weeks to complete the survey. A reminder was sent midway through the survey period.

Adoption of AIMS was categorized as follows: (1) currently using; (2) currently using, but planning to upgrade; (3) in process of implementing; (4) purchased, but implementation not started; (5) intending to purchase; (6) not using or intending to purchase. Categories 1 through 5 were defined as adopters and category 6 as non-adopters.

Factors for acquiring an AIMS were ranked using a 5 level Likert scale: 1 = absolutely unimportant, 2 = unimportant, 3 = neutral, 4 = important, 5 = absolutely important. Sites were asked about the outcomes of AIMS implementation. Non-adopters were asked about barriers to implementation.

Results: Responses were obtained from 21 of 40 sites contacted (52%) as follows:
1. Currently using = 3
2. Currently using but planning to upgrade = 3
3. Currently implementing = 0
4. Purchased but not yet implementing = 2
5. Intending to purchase = 10
6. Not using or intending to purchase = 3

The top ranked (median Likert score ≥ 4) anticipated benefits for AIMS adoption were: patient safety, data collection for quality assurance, and data for research. These were also identified as perceived outcomes in the departments which had implemented AIMS.

The main considerations prior to purchasing an AIMS were financial, administrative, technological and training support.

Financial issues regarding start-up costs and maintenance were the greatest barriers to implementing an AIMS (median Likert score ≥4).

Discussion: AIMS were in current use, being implemented, or intending to be purchased in 86% of responding sites, or 45% of all sites contacted. The data is similar to previous reports of adoption rates in the United States(1) and greater than in Europe(2). The main limitations of the study were exclusion of French-speaking sites, responder bias, and the response rate of only 52%. This response rate is typical for physician completed electronic surveys(3,4). No information is available about sites that did not respond, despite the follow-up e-mail midway through the survey period.

References: (1)Anesth Analg 2008 107: 1323-1329
(2)Euro J of Anesthesiology 2010 27: 202-208
(3)J Clin Epidemiol 2005 58: 425-429
(4)J Med Internet Res 2004 6:e39
SAFETY IV CATHETERS AND THE PEDIATRIC ANESTHESIOLOGIST

Kimmo Murto1, Sophie Breton2, Kelly-Ann Ramakko2, Robert Perverseff3, Gregory L. Bryson2

1. Anesthesiology, Children's Hospital of Eastern Ontario, Ottawa, ON, Canada
2. Clinical Research Unit, Children's Hospital of Eastern Ontario Research Institute, Ottawa, ON, Canada
3. Anesthesiology, Royal University Hospital, Saskatoon, SK, Canada

Introduction: Safety IV catheters (SICs) were designed to reduce needle stick (NS) injuries among operators including anesthesiologists, a high risk group. An initial 2006 survey indicated SICs were available in 62% of the 16 Canadian tertiary care pediatric centers (CTCPCs). When available, 56% of pediatric anesthesiologists reported using them. The objectives of this survey were to describe current availability and adoption, employed mechanisms, operational issues and attitude towards SICs and compare these results to a 2006 survey.

Methods: After REB approval e-mail addresses of 223 practicing anesthesiologists were obtained from 16 CTCPCs. Survey design and implementation used Dillman’s methodology [1]. Validity and reliability were previously established. Attitudes towards SIC related statements were expressed as a 5-point Likert scale (strongly disagree to strongly agree). Questions pertained to SIC availability, mechanisms of action, functional issues, recommendations for improvement and safety related issues. Checkbox™ software was used to implement the internet survey. Survey response implied consent. A 5% sampling error with 95% confidence required 141 responses [1]. Data are described as counts or percentages. Mann-Whitney and Chi-Square tests were used where appropriate.

Results: Response rate was 69% (154). All CTCPCs were represented. Respondent median age bracket was 41-50 years with an increase in the age >50 year cohort compared to 2006. Attitudes regarding SICs and mandatory use (agree in 2012 vs. 2006: 39% vs. 37%, p=0.36), reduced NS injury (agree 51% vs. 48%, p=0.7) and reduced quality of care (agree 42% vs. 32%, p=0.15) had not changed. SIC availability and utilization are reported in Table 1. SICs were unavailable in many Quebec ORs. The prevalence of passive self-blunting mechanisms had increased (36% vs. 16%, p<0.001). Awkwardness and poor flashback persisted to be key areas for improvement while a need for guide-wire passage through smaller catheters was most prominent in 2012. Overall, satisfaction remained unchanged (69% vs. 55%, p=0.22). Reported IV NS injuries were similar (13 vs. 15) as were other sources of injury (suture needle, med. vial access, needle re-cap). However, injuries related to IV port injection had declined (11 vs. 21). Respondents (38%) were unaware if their disability insurance covered hospital acquired infections. The majority (75%) opposed mandatory testing for blood-borne pathogens.

Discussion: Satisfaction and attitudes toward SICs have not changed. Market penetration has increased, with passive mechanisms becoming more prevalent. Key areas for catheter improvement persist; further industry attention is required.


Table 1: Availability and utilization of safety IV catheter among Canadian pediatric anesthesiologists

<table>
<thead>
<tr>
<th>Questions</th>
<th>2012, N (%) Responded ‘Yes’</th>
<th>2006, N (%) Responded ‘Yes’</th>
<th>Chi-Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are SICs available in your hospital?</td>
<td>151 (98)</td>
<td>102 (82)</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>Are SICs available in your OR?</td>
<td>132 (86)</td>
<td>77 (62)</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>If available, do you routinely use SICs?</td>
<td>112 (85)</td>
<td>43 (56)</td>
<td>p&lt;0.001</td>
</tr>
</tbody>
</table>
1652175 - FATTY EMULSION: SURVIVING CLONIDINE & PROPRANOLOL OVERDOSE

Kimberly Macala¹, Natalie Bandrauk², Andrew Smith³

1. Discipline of Anesthesia, Memorial University of Newfoundland, St. John’s, NF, Canada
2. Critical Care Medicine, Memorial University of Newfoundland, S. John’s, NF, Canada
3. Emergency Medicine, Memorial University of Newfoundland, S. John’s, NF, Canada

Purpose: Our objective is to briefly review the treatment choices for clonidine and propranolol overdoses and suggest intravenous fatty emulsion (IFE) as treatment.

Clinical Features: A 48 year old female was found at 0650. Estimated ingestion was clonidine 2.8 mg, propranolol 1,120 mg, escitalopram 400 mg, lorazepam 28 mg, atorvastatin 560 mg, and quetiapine 5,600 mg. Three litres of normal saline were given. Emergency Department arrival was at 0800. Pulse rate was 71, SBP was 70mmHg, and a GCS of six. Pupils were two mm and reactive. Blood glucose was 7.3mmol/L before rapid sequence intubation with propofol 50mg and succinylcholine 120mg. Naloxone, glucagon, epinephrine, dopamine and vasopressin infusions failed. At 0900 Novolin GE Toronto 120 units/hr was started. Glucagon and naloxone infusions were stopped. SBP remained 60-70s mmHg.

Arterial blood gas (FiO₂ 1.00) showed pH 7.160, pO₂ 69 mmHg, pCO₂ 38.6 mmHg, HCO₃ 13.7 mmol/l, lactate 3.8mmol/l. At 1130, 100 ml of 20% IFE was given over five minutes followed by 400 ml infusion over twenty minutes as per local anesthetic toxicity protocol. SBP was 82 mmHg at 1200 and 100mmHg by 1215. All vasopressors were stopped at 1230. Toxicity recurrence was not observed. The patient was extubated the next day with no obvious adverse effects. Patient consent was obtained for case presentation.

Conclusion: Clonidine is a central alpha-2 adrenergic receptor agonist. In the 2009 Annual Report of the American Association of Poison Control Centers Toxic Exposure Surveillance System1, there were 7,259 reported exposures to clonidine. Of the 7,259 exposures, 4,032 involved solely clonidine. The mainstay of overdose treatment is supportive treatment. Activated charcoal following ingestion of clonidine may be used. Naloxone has been used with variable success, but may worsen hypotension. Propranolol is a non-selective beta-blocker. In the 2009 Annual Report of the American Association of Poison Control Centers Toxic Exposure Surveillance System, there were 22,135 reported exposures to a beta adrenergic blocker. 10,217 of these cases involved solely beta-blockers. Overdose treatment includes supportive therapy, activated charcoal, glucagon or high dose insulin and glucose2, benzodiazepines for seizure treatment, and selective hemodialysis. IFE resuscitation from tricyclic anti-depressants, beta-blockers, calcium channel blockers and local anesthetic toxicity has been described in animal models.3 Human resuscitation research has been observational.3 There are multiple proposed mechanisms of action. IFE may work by the lipid sink hypothesis in which IFE provides an expanded lipid phase to draw the drug from its site of action preventing overdose symptoms.3 IFE may also increase mitochondrial oxidative phosphorylation by increasing myocardial use of free fatty acids, improving myocardial function.3 IFE may directly stimulate voltage-gated calcium channels in a dose-dependent manner.4 IFE has life-threatening side effects including anaphylaxis.5 In life-threatening overdoses, the possible benefits must be balanced against the potential risks.

A NOVEL EXTUBATION WITH LMA & EXCHANGE CATHETER IN A DIFFICULT AIRWAY

Raviraj Raveendran¹, Sunita G. Sastry¹, David T. Wong¹

1. Anesthesia Dept, Toronto Western Hospital, University of Toronto, Toronto, ON, Canada

Purpose: Exchanging a LMA for an endotracheal tube (ETT) has been described for smooth extubation to avoid coughing at the time of emergence from anesthesia.¹ ² ³ This is also, one of the three advanced extubation techniques recommended by the recent DAS extubation guideline.⁴ But there is a chance of losing the airway during the exchange procedure. We describe a novel bridging LMA exchange technique in a patient with a difficult airway.

Clinical Features: Patient consent for publication was obtained. A 38 year old, 60kg lady was scheduled to have total thyroidectomy. Her airway assessment revealed limited neck extension, receding chin and Mallampati 3. Direct laryngoscopy showed a grade 3 view with external laryngeal pressure and was intubated with a 7.5mm ID ETT over a bougie. At the end of the surgery, surgeon requested a smooth extubation with minimal cough. We planned on a bridging LMA extubation technique. End-tidal sevoflurane was increased from 1 to 1.5 MAC and 3 ml of 2% lidocaine was sprayed endotracheally. Then an airway exchange catheter (19F, Cook Inc) was inserted inside the ETT and ETT was removed. A Size 3 LMA ProSeal without the metal introducer was railroaded over the exchange catheter into the pharynx. An elbow connector with a bronchoscopy port was connected to the LMA-ProSeal. The distal end of the exchange catheter remained in the trachea while the proximal end protruded through the elbow connector port and occluded by tape (Figure 1). Adequate positioning of the LMA-ProSeal was indicated by normal capnography waveform and no cuff leak. The patient was given muscle relaxant reversal, and spontaneous ventilation returned. If either positive ventilation or spontaneous ventilation via the LMA-Proseal was not adequate, ETT would be reintroduced over the exchange catheter and conventional extubation ensues. Sevoflurane was turned off, the patient was awakened. The patient did not cough and the LMA-ProSeal was removed.

Conclusion: In a patient with difficult intubation, we performed bridged extubation with the insertion of an exchange catheter and LMA-ProSeal, and extubation of the LMA without coughing. It can serve as an alternative technique to the Bailey maneuver LMA insertion for bridged extubation.

Purpose: Use of the Glidescope videolaryngoscope in placement of an Aintree intubating catheter (AIC) via bronchoscopy and subsequent advancement of a reinforced tracheal tube over the AIC in the oral intubation of a patient with a large multinodular goiter causing significant tracheal compression.

Clinical Features: An elderly female presented with a goiter that was increasing in size and causing exertional dyspnea. Computed tomography of the neck showed a multinodular goiter with a large nodule in the isthmus measuring 5.3cm by 4.5cm by 4.4cm that was compressing the lower trachea just above the carina resulting in marked tracheal compression to 0.6cm at a distance of 4.7cm below the vocal cords. A total thyroidectomy was planned. Easy bag mask ventilation was achieved after preoxygenation and intravenous induction. Laryngoscopy using a Glidescope AVL with size 3 blade was performed by the staff anesthesiologist and it showed a Grade I larynx. A 3.7mm (outer diameter) flexible video bronchoscope was loaded with a AIC and handled by the anesthesiology fellow. The AIC was 56cm long which resulted in approximately 4cm of the flexible scope protruding beyond its length but enough to position the AIC into the trachea. The bronchoscope was inserted orally following the Glidescope blade, past the glottis and down to the carina. The AIC was deployed in the trachea and the bronchoscope was then removed. Subsequently with the Glidescope in-situ, a 6.5mm (internal diameter) lubricated reinforced tracheal tube was advanced without difficulty over the AIC beyond the obstruction. The advancements of the bronchoscope with AIC followed by the tracheal tube through and beyond the vocal cords were monitored using the Glidescope. At the conclusion of surgery, there was no evidence of laryngeal injury or tracheomalacia. The patient was extubated uneventfully.

Conclusion: Use of the Glidescope videolaryngoscope facilitated placement of an AIC via bronchoscopy and subsequent advancement of a reinforced tracheal tube over the AIC in the successful oral intubation of a patient with a large multinodular goiter causing significant tracheal compression.

A SURVEY ON THE USE OF COMBINED SPINAL-EPIDURALS IN OBSTETRICS BY ANAESTHETIC TRAINEES

Jonathan Yen¹, Jason Cronje², Liang Wee³

1. Anesthesia, The Ottawa Hospital, Ottawa, ON, Canada
2. Anaesthesia, Barnet General Hospital, London, United Kingdom
3. Anaesthesia, University College Hospital, London, United Kingdom

Introduction: Combined spinal-epidurals (CSE) are increasingly being used in obstetric anaesthesia for labour analgesia and lower segment Caesarean sections (LSCS). Despite the use of evidence-based medicine and competency-based training in anaesthesia, individual practice can vary. A survey was performed to see if there was any regional variation in British obstetric anaesthetic training.

Methods: An electronic survey was designed on the website SurveyMonkey (http://www.surveymonkey.com) and sent by email to all 28 Schools of anaesthesia in the United Kingdom. Trainees were asked to respond about their use of CSE for labour analgesia and elective LSCS.

Results: The survey was completed by 327 trainees (response rate 9.8%) from 22 schools of anaesthesia. 211 (65%) of respondents indicated that they performed CSE for obstetric anaesthesia. Table 1 shows the preferences of these trainees. Reasons cited for using CSE in elective LSCS were the ability to prolong neuraxial blockade (74%), local policy (67%), and using the epidural as a backup if the spinal fails (62%).

Discussion: Though most respondents stated that they performed CSE, a large proportion of trainees did not, despite increasing evidence that the CSE technique is advantageous for both labour and LSCS. CSE has been shown to have less motor block, and a higher rate of catheter success than compared to conventional epidurals. Reassuringly, there is no increased risk of anaesthetic complications with CSE, including post-dural puncture headache.¹

It seems that most trainees do not use CSE as their anaesthetic technique of choice for elective LSCS. The respondents that did use it stated that their main reason was for the flexibility of having the epidural catheter, which can result in a lower risk of converting to a general anaesthetic.² It has been shown that CSE allows for a reduced intrathecal dose to be given for LSCS, resulting in less hypotension and faster motor recovery.³

In conclusion, though most British anaesthetic trainees are performing CSE for obstetric anaesthesia, not many are doing them on a routine basis, especially for elective LSCS, despite increasing evidence of the advantages of CSE. This has implications on the ability of the trainee to perform this technique in an emergency situation. This survey is hampered by the low response rate.


Table 1. Preferences of trainees who performed CSE. Values are numbers (%).

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perform CSE in labour room</td>
<td>130 (62%)</td>
<td>81 (38%)</td>
</tr>
<tr>
<td>Perform CSE for Elective LSCS</td>
<td>61 (29%)</td>
<td>150 (71%)</td>
</tr>
</tbody>
</table>
1653534 - EXPANDING NECK MASS UNDER GENERAL ANESTHESIA

Michael Vargo¹, Edmund Tan¹, Christian Lehmann¹

1. Anesthesia, Dalhousie University, Halifax, NS, Canada

Purpose: To increase awareness of the prevalence and hemodynamic implications of vascular malformations.

Clinical Features: A 26 year old male presented for arthroscopic repair of his ankle. He was given a general anesthetic and was breathing spontaneously through an LMA. A neck mass, that was not apparent before the induction of anesthesia, appeared during the case. It caused a large leak in the breathing circuit. The patient clinically had a deviated trachea. The airway was secured. A CT scan revealed a vascular mass not involving airway structures. The mass slowly regressed during the CT scan and he was extubated shortly thereafter. The patient has consented to the publication of this report.

Conclusion: The classification of congenital vascular tumours can be confusing due to historic nomenclature. In the past, almost every vascular tumour was labeled hemangioma(1). The work of Molliken & Glowacki resulted in broadly dividing congenital vascular anomalies into two subgroups; hemangiomas and vascular malformations(2).

Hemangiomas are benign vascular tumours. The most common type is infantile hemangioma, which occurs, in 4% of Caucasian infants at 1 year of age. It regularly involutes before age 10(3).

Vascular malformations have a prevalence of 1.2%-1.5% in the general population(4). Venous malformations are the most common subtype. They have normal endothelial turnover and grow commensurately with a child. They are typically compressible and non-pulsatile(4,6). One review of intramuscular venous malformations noted distention with dependent positioning, exertion, and spontaneous intermittent distention in 37%, 20% and 24% of patients respectively(7).

The non-pulsatile, subcutaneous nature of our patient’s vascular lesion leads us to believe it was a low flow vascular malformation of venous origin. It enlarged clinically while under general anesthesia. Possible reasons for this include the vasodilatory properties of the anesthetic, compression of the outflow vasculature of the malformation due to compression of the wall of the larynx by the LMA, and increased intrathoracic pressure from a short period of positive pressure ventilation.

1653602 - AN INFUSION RATE MONITOR FOR USE IN INTRAVENOUS THERAPY

Richard N. Merchant¹, Ryan Yee², Joel Wiedman², Cody Robson²

1. Department of Anesthesia, University of British Columbia, New Westminster, BC, Canada
2. Faculty of Applied Science, University of British Columbia, New Westminster, BC, Canada

Introduction: Management of intravenous fluid administration is a core anesthesia task and new parameters are constantly appearing. Liberal, restricted, and now goal-directed fluid therapy are management paradigms. Conventional fluid monitor/controller pumps are widespread but expensive, prone to alarming and failure, often difficult to program, and frequently not available. As a consequence they are little-used in routine OR management save for the control of vasoactive medications. The infusion rate monitor is device to assist clinicians in simple and routine fluid management tasks. The primary focus of this project was to design a user interface (UI) and make improvements with the acquisition of user feedback. The results observed thus far will give the direction and narrow the scope for future design changes.

Methods: As a project for a university undergraduate engineering lab, an infusion monitor was designed to attach to a unmodified drip chamber and detect interruptions of an optical sensor which corresponds to “drips”. Once the device is calibrated in the settings menu, the device then displays in real-time the necessary IV therapy parameters. The prototype was fabricated and tested in a laboratory environment to analyze the functionality of the drip detector and UI. The device then received feedback from medical personnel and fellow engineers through a revision process. Participants were given a brief introduction, but relevant operational instructions were undisclosed, allowing for an authentic test of usability. Participants were tasked to set the parameters of the device and then run the program. While on video, they voiced their thought process and immediate concerns about the device.

Results: Measurements show that optical drip detection is 100% accurate before factoring in a UI. Due to the choice of microcontroller for this research, implementing a TFT display for a UI, decreases efficiency of drop detection to ~95%. The first revision of the device was evaluated by four different users: a university professor, and three university students. Users reported five key issues with the design: Intuitive menu navigation, menu and user-parameter selection, system responsiveness, and overall device bulkiness. The user based study for the first revision showed that 100% of users required assistance to operate the device. The second revision was then evaluated by four new users: anesthesiologist, an industry engineer, and two university students. Users consistently reported that accuracy of the parameter selection was an issue, as was physical size of the device. Results showed that with the second revision, improvements to software were implemented. This allowed users to successfully and independently interact with the device with no training.

Discussion: Overall, these results suggest that with further usability testing on clinicians in the field, the design features and UI can be further focused to adequately suit their needs.
1653610 - DES MODEL OF OR EFFICIENCY COMPARING TWO NMB REVERSAL AGENTS

Alexandra Goyette¹, André Jacques², Andre Galarneau¹, Ralph Insinga², Eric M. Maiese², Susan Grant¹

1. Merck Canada Inc., Kirkland, QC, Canada.
2. Trellisys Technologies Inc., Pointe-Claire, QC, Canada.

Introduction: Sugammadex is a novel agent that rapidly and predictably reverses neuromuscular blockade (NMB). Comparative clinical trials have demonstrated there is less variability in NMB recovery time with sugammadex compared with neostigmine, which may reduce operating room (OR) procedure times and allow consistent on-time completion of surgery caseloads. Use of Discrete Event Simulation (DES), a powerful technique to simulate the behavior of a system according to changes in one or more of its dynamic and stochastic components, allows an assessment of the potential impact of use of sugammadex in the real-world. The objective is to describe the ongoing development of a DES model to evaluate the impact on OR efficiency of implementing sugammadex for reversal of NMB compared to the current standard of care (SOC), neostigmine, in Canada.

Methods: A DES model was developed comparing two independent ORs, one using neostigmine and the other sugammadex. An equal number of similar elective surgeries are scheduled in both ORs. The same OR parameters, including OR start time, OR end time, time to start of first surgery, and time between surgeries, are shared by the two ORs. Information on these OR parameters is derived from the literature, where available. The time for surgeries and the time between tracheal extubation and OR discharge are derived from RECITE, a recently completed Canadian observational study. Time between administration of the reversal agent and tracheal extubation is derived from a head-to-head randomized controlled trial that compared the two drugs. The base case scenario assumes that patients are extubated when they achieve the recommended recovery of a Train-of-Four (TOF) ratio of 0.9. A second scenario used SOC data from RECITE where patients were extubated based on clinical criteria. During each run, the model calculates a value for each input according to a statistical distribution for that parameter.

Results: Using the above parameters, the primary outcome of the DES model will be the percentage of days in which all scheduled surgeries are completed before the end of the OR day. The model will also evaluate the frequency and duration of overtime by OR personnel and the probability of procedural cancellation. Preliminary model results show that, depending on assumptions concerning the ability of sugammadex to shorten total OR procedure times, an OR using sugammadex can potentially complete a higher percentage of scheduled surgeries before the end of the OR day and yield fewer overtime hours.

Discussion: Using sugammadex for NMB reversal might lead to meaningful improvement of OR efficiency compared to SOC. However, additional work, including advisory panel input, is underway to better understand conditions under which this may occur, refine and finalize the model, convert outcomes to reflect financial impact for hospitals, and convey base case findings.
1653710 - INSTRUCTOR VS WITHIN-TEAM LED DEBRIEFINGS: A QUALITATIVE ANALYSIS

Sylvain Boet1, Ashlee-Ann Pigford2, Amber Fitzsimmons3, Scott Reeves4, Emmanuel Triby5, Dylan Bould6

1. Anesthesiology, The Ottawa Hospital, University of Ottawa, Ottawa, ON, Canada
2. The Ottawa Hospital Research Institute, Ottawa, ON, Canada
3. Physical Therapy, University of California San Francisco, San Francisco, CA, United States
4. Social & Behavioral Sciences, University of California San Francisco, San Francisco, CA, United States
5. Faculty of Education, University of Strasbourg, Strasbourg, France
6. Anesthesiology, The Children’s Hospital of Eastern Ontario, University of Ottawa, Ottawa, ON, Canada

Introduction: Debriefing following full-scale high-fidelity simulation has been shown to improve non-technical skills for crisis resource management (CRM). Although it is recognized that debriefing is key for simulation learning, there is very little data on what happens during debriefing. The aim of this study is to explore and compare the content of inter-professional team debriefings after a simulated crisis scenario for both within-team debriefings and facilitator-led debriefings.

Methods: Institutional Ethics Board approval was obtained for this research project. As part of a mixed methods study, 120 subjects were grouped into 40 operating room (OR) teams consisting of one anesthesia trainee, one surgical trainee and one staff circulating OR nurse. All teams managed a simulated crisis scenario (pre-test). Teams were then randomized to either a within-team debriefing or an instructor-led debriefing. In the within-team debriefing group, the teams reviewed the video of their scenario by themselves, guided by a within-team debriefing form based on the Ottawa Global Rating Scale rating scale. The teams in the instructor debriefing group reviewed their scenario guided by a trained instructor. Previous publication showed that within team debriefing is effective in improving CRM team performance [1]. Debriefings were digitally recorded and transcribed. Data was thematically coded and findings from the two types of debriefings were compared.

Results: Preliminary qualitative analysis has revealed that CRM topics were the main focus of discussion for both within-team and instructor team debriefings. Regardless of debriefing style, participants discussed communication, leadership, situation awareness, the roles and responsibilities of different team members. Aside from CRM categories, both groups also discussed the nuanced fidelity of simulation. Furthermore, participants in both groups reflected on their performance and suggested solutions for improvement. The within-team debriefing group often referred to their within-team-debriefing form in order to guide their discussions. While the instructor debriefing teams followed a precise structure, the within team debriefing teams appeared to be less organized and structured. We are finalizing data analysis and, if this abstract is selected, final results will be presented at the 2013 Canadian Anesthesiologists’ Society meeting.

Discussion: This qualitative study improves our understanding of the similarities and differences between within-team and instructor led debriefings. Our data suggest that authentic reflection might be a key element of an effective debriefing in both groups, regardless of the structure of the debriefing process. The implications of this research are important for understanding how to best create education opportunities for physicians and other care providers that work in interprofessional settings, with or without an instructor.

1653720 - THE IMPACT OF SIMULATION-BASED CRISIS RESOURCE MANAGEMENT TRAINING: A SYSTEMATIC REVIEW

Lillia Fung¹, Sylvain Boet¹, Haytham Qosa², Walter T. Tavares³, Laure Perrier ⁴, Andrea Tricco ⁴, Scott Reeves⁵, Dylan Bould⁶

1. Anesthesiology, The Ottawa Hospital, University of Ottawa, Ottawa, ON, Canada
2. The Ottawa Hospital Research Institute, Ottawa, ON, Canada
3. The Wilson Centre, Toronto, ON, Canada
4. Li Ka Shing Knowledge Institute, St Michael’s Hospital, Toronto, ON, Canada
5. Social & Behavioral Sciences, University of California San Francisco, San Francisco, CA, United States
6. Anesthesiology, Children’s Hospital of Eastern Ontario, University of Ottawa, Ottawa, ON, Canada

Introduction: Simulators are increasingly recognized as useful educational adjuncts in healthcare [1]. Simulation-based education is ideal for teaching the principles of crisis resource management (CRM) [2]. In this context of crisis, the importance of non-technical skills such as task management, team working, situation awareness, or decision-making, can be safely practiced. The ultimate goal of all CRM simulation training is to increase patient safety through better patient outcomes. Although numerous studies have been published on the topic, we are missing a knowledge synthesis of the impact of simulation-based education for CRM training on patient outcome and healthcare providers learning. We aim to appraise and summarize the impact of CRM simulation-based training on healthcare providers learning and on patients’ outcomes.

Methods: A systematic review of Institutional Ethics Board approved trials for CRM simulation-based training was performed. Medline, EMBASE, CINAHL, Cochrane Central Register of Controlled Trials, and ERIC were searched on September 4, 2012. Searches were performed with no year or language restrictions. The following search terms were used: crisis resource management, crisis management, crew resource management, teamwork, and simulation. Appropriate wildcards were used in the searching in order to account for plurals and variations in spelling.

Studies were included if they were:
(i) Cohort studies, case-control studies and randomized controlled trials or quasi-randomized studies,
(ii) Published in English or French,
(iii) The outcome is at the level 2 to 4 Kirkpatrick’s level studies [3]. In this systematic review, we deliberately excluded studies investigating only at the Kirkpatrick level 1 outcome (learners reactions: “did trainees like the educational intervention?”) because we aim to appraise learning and not learners’ reactions.
(iv) Comparing simulation-based (virtual reality, screen simulator, low fidelity simulator, high fidelity simulator, virtual reality, human simulation) education versus any other method of education or no training,
(v) Involving CRM educational intervention.
All healthcare professionals, all levels of training (undergraduate, postgraduate, staff), all specialties were considered.

The articles were evaluated for validity, and data were extracted by the authors.

Results: Literature search was performed on September 4th, 2012. A total of 7100 abstracts have been identified and under final review. If this abstract is accepted, final results of this systematic review will be presented at the 2013 Canadian Anesthesiologists’ Society meeting.

Discussion: The findings of this systematic review will appraise the utility of CRM programs for healthcare professionals and patients. Our findings will contribute to better orientate future research in CRM simulation based education.

References: 1. Jama 306: 978-988
2. Simulation & Gaming 32: 175-193
3. Medical Teacher 29: 735-751