# FACULTY DEVELOPMENT DAY 2016

## COMPETENCE BY DESIGN:
*MEDICAL EDUCATION AND ASSESSMENT*

**OPENING ADDRESS by Dr. Barry McLellan**
CEO and President of Sunnybrook Health Sciences Centre

## FRIDAY NOVEMBER 11TH
7:45 AM - 3:00 PM

89 Chestnut Residence and Conference Centre
University of Toronto
2nd Floor (Colony Grand Ballroom)

## *Anesthesia Abstracts*

Anesthesia
UNIVERSITY OF TORONTO

Surgery
UNIVERSITY OF TORONTO

# Faculty Development Day 2016

**DEPARTMENTS OF ANESTHESIA & SURGERY** **FRIDAY, NOVEMBER 11, 2016**
**UNIVERSITY OF TORONTO** **89 CHESTNUT RESIDENCE & CONFERENCE CENTRE**

## 07:00 Breakfast & Registration

LOCATION: COLONY GRAND BALLROOM, 2ND FLOOR

## 07:45 Introductions

LOCATION: COLONY GRAND BALLROOM, 2ND FLOOR

**Brian Kavanagh,** Chair, Department of Anesthesia
**Jim Rutka,** Chair, Department of Surgery
**Vincent Chan,** Program Chair, Anesthesia, Faculty Development Day

## 07:55 Welcoming Remarks

LOCATION: COLONY GRAND BALLROOM, 2ND FLOOR

**Barry McLellan,** CEO and President, Sunnybrook Health Sciences Centre

## 08:05 Plenary Session

LOCATION: COLONY GRAND BALLROOM, 2ND FLOOR

***"COMPETENCY BASED MEDICAL EDUCATION (CBME) AND ASSESSMENT"***
**Panel: Susan Glover Takahashi, Scott Berry, Markku Nousiainen, Lisa Bahrey**

## 09:20 – 10:40 Parallel Workshops – Session #1

**1** Competency By Design
**Susan Glover Takahashi**, **Lisa Bahrey, Scott Berry, Paolo Campisi, Rebecca Dubé & Markku Nousiainen**
LOCATION: COLONY GRAND BALLROOM, 2ND FL.

**2** New Technology: Apps and Medical Devices: Practical guidelines for medical educators and innovators
**Clyde Matava**
LOCATION: GIOVANNI ROOM, 2ND FL.

**3** Social Media in Medical Education
**Fahad Alam, Melinda Musgrave & Justin Morgenstern**
LOCATION: CARLTON ROOM, 2ND FL.

**4** Global Health Outreach
**Mark Bernstein, Mojgan Hodaie, Greg Silverman & Rachel Spitzer**
LOCATION: ST. LAWRENCE ROOM, 3RD FL.

**5** Assisting Students in Difficulty (Residents & Undergraduates)
**George Christakis, Mark Levine & Ron Levine**
LOCATION: ELM ROOM, 2ND FLOOR

**7** Assessing Technical Skill Acquisition
**Zeev Friedman & Oleg Safir**
LOCATION: ST. PATRICK SOUTH, 3RD FL.

**8** Leadership and Strategy
**Robin Richards**
LOCATION: ST. DAVID ROOM, 3RD FL.

**9** Mindfulness & Wellbeing
**Christopher Trevelyan**
LOCATION: ST. PATRICK NORTH, 3RD FL.

**11** Practical Tips to Success in Research
**Andras Kapus & Beverley Orser**
LOCATION: ARMOURY ROOM, 2ND FL.

## 10:30 – 11:00 Poster Session and Refreshments

LOCATION: COLONY GRAND BALLROOM, 2ND FLOOR

1 Can Simulation Help our Medical Students "Choose Wisely"?
**Thiago Appoloni Moreira**, St. Michael's Hospital

2 The Managing Emergencies in Pediatric Anesthesia (MEPA) Global Rating Scale is reliable and valid for simulation-based assessment in anesthesia: an international multicentre study
**Tobias Everett**, The Hospital for Sick Children

3 Beyond a good story: from Hawthorne Effect to reactivity in healthcare research
**Elise Paradis**

4 A simulation-based rounds curriculum for residents
**Katherine Marseu**, UHN-Toronto General Hospital

5 Combination of anesthesia and surgical undergraduate medical curricula, to form an integrated perioperative curriculum
**Natalie Clavel**, UHN-Toronto Western Hospital

6 Hands-On Small Group Sessions Using Ultrasound to Tech Anatomy in Medical School
**Adrian Koziak**, Sunnybrook Health Sciences Centre

7 Factors influencing fellowship training and a future research career
**Doreen Yee**, Sunnybrook Health Sciences Centre

8 Exploring self-regulatory processes in anesthesiologists during a simulated crisis scenario: a psychometric study
**Maya Contreras**, St. Michael's Hospital

9 Airway Ultrasonography Training Improves Percutaneous Identification of the Cricothyroid Membrane
**Eric You-Ten**, Sinai Health System

10 A survey of Canadian anesthesiologists and residency program directors assessing education in environmental sustainability
**Maria Petre**, Sunnybrook Health Sciences Centre

11 Introducing the Early-Stage Anesthesiology Scholars
**Sinziana Avramescu**, Sunnybrook Health Sciences Centre

12 The impact of a on line lung Ultrasound Module in learning basic lung point of care ultrasound
**Massimiliano Meineri**, UHN-Toronto General Hospital

13 Rapid Cycle Deliberate Practice in Medical Education - A Systematic Review
**Jillian Taras**, Hospital for Sick Children

14 Preventing & Managing Chronic Postsurgical Pain with a Patient-Driven Mobile Platform
**Abid Azam**, UHN-Toronto General Hospital

15 Virtual Reality for educating and reducing preoperative anxiety in Children – design, face validity and acceptability by healthcare
**Ben O'Sullivan**, The Hospital for Sick Children

16 Alleviating pre-operative anxiety through patient education with innovative 3D immersive virtual reality-Work in Progress
**Fahad Alam**, Sunnybrook Health Sciences Centre

17 Development and implementation of a novel app for improving anesthesia operating room equipment supply
**Michael Tan**, The Hospital for Sick Children

18 A student-led, resident-only eLearning platform - a new and acceptable concept for anesthesia residency
**Tariq Esmail**, Sunnybrook Health Sciences Centre

19 Wrist-worn Activity Trackers to Evaluate a New "Early Ambulation Following Cesarean Delivery" Policy: QI/ Patient safety Audit
**David MacLean**, St. Michael's Hospital

20 Improving the Quality and Impact of M and M Rounds
**Michelle Chochinov**, Sunnybrook Health Sciences Centre

21 Tranexamic acid dosing for cardiac surgical patients with chronic renal dysfunction: Taking 2nd look to optimize patient safety
**Angela Jerath**, UHN-Toronto General Hospital

22 Attendance at an Interprofessional Pediatric Chronic Pain Clinic Reduces Healthcare Utilization: A Retrospective Analysis
**Fiona Campbell**, The Hospital for Sick Children

## 11:00 – 12:30 Parallel Workshops – Session #2

**1** *CONTINUED FROM SESSION 1*: Competency By Design
**Susan Glover Takahashi**, **Lisa Bahrey, Scott Berry, Paolo Campisi, Rebecca Dubé & Markku Nousiainen**
LOCATION: COLONY GRAND BALLROOM, 2ND FL.

**2** New Technology: Apps and Medical Devices: Practical guidelines for medical educators and innovators
**Clyde Matava**
LOCATION: GIOVANNI ROOM, 2ND FL.

**3** Social Media in Medical Education
**Fahad Alam, Melinda Musgrave & Justin Morgenstern**
LOCATION: CARLTON ROOM, 2ND FL.

**4** Global Health Outreach
**Mark Bernstein, Mojgan Hodaie, Greg Silverman & Rachel Spitzer**
LOCATION: ST. LAWRENCE ROOM, 3RD FL.

**5** Assisting Students in Difficulty (Residents & Undergraduates)
**George Christakis, Mark Levine & Ron Levine**
LOCATION: ELM ROOM, 2ND FLOOR

**6** Continuing Medical Education: How to Change Practice Behaviour Long Term
**Terry Axelrod & Peter Slinger**
LOCATION: TERRACE ROOM, 2ND FL.

**7** Assessing Technical Skill Acquisition
**Zeev Friedman & Oleg Safir**
LOCATION: ST. PATRICK SOUTH, 3RD FL.

**8** Leadership and Strategy
**Robin Richards**
LOCATION: ST. DAVID ROOM, 3RD FL.

**10** Understanding the Promotion Process
**Howard Clarke & Mark Crawford**
LOCATION: ST. GEORGE, 3RD FL.

**11** Practical Tips to Success in Research
**Andras Kapus & Beverley Orser**
LOCATION: ARMOURY ROOM, 2ND FL.

**12:30 – 1:30 Lunch**
Location: Colony Grand Ballroom, 2nd Floor

## Department of Anesthesia – Afternoon Program

### 1:30 – 2:20 Scientific Oral Presentations (Anesthesia)

LOCATION: COLONY GRAND BALLROOM, 2ND FLOOR

Determining Construct Validity of Virtual Reality Spine Simulation Modules, **Monica Liu,** UHN-Toronto Western Hospital

Low cost 3D printed ballistics gel heart phantom to train in transesophageal echocardiography, **Giuliamaria Ruggeri, U**HN-Toronto General Hospital

Enhancing Anesthesiology Trainee Performance in Critical Events using Cognitive Aids, **Asad Siddiqui,** The Hospital for Sick Children

Tackling a $600,000 problem - Improving Emergency Theatre Utilization, **Kim Wild,** UHN-Toronto Western Hospital

### 2:20 – 2:40 Awards (Anesthesia)

- The Dr. John Desmond Award (for excellence in undergraduate teaching)
- The Dr. Gerald Edelist Award (for excellence in postgraduate teaching)

- The David Fear Award (for excellence in continuing medical education and professional development)
- The UT Anesthesia Interprofessional Teaching Award (for outstanding teaching both within – *and outside* – the anesthesia community)
- New Faculty Teaching Excellence Award (outstanding new faculty member, teacher and mentor)
- Best Oral Presentation Award: Faculty Development Day 2016
- Best Poster Presentation: Faculty Development Day 2016
- People's Choice Awards: Best Poster and Best Oral presentations, Faculty Development Day, 2016

**2:40 – 2:45 Closing Remarks and Departure (Anesthesia)**

## Department of Surgery – Afternoon Program

**1:30 – 3:30 Presentations (Surgery)**
Location: Terrace Room, 3rd Floor

**1:30** – **2:00** Bruce Tovee Undergraduate Award Winner Lecture: New undergraduate curriculum at the University of Toronto. Dennis Di Pasquale.

**2:00** – **2:30** Bruce Tovee Postgraduate Award Winner Lecture: Global Surgery: Perspectives on value as a scholarly track. Georges Azzie.

**2:30 – 3:00** (For new surgeons only): Everything you need to know about practice plans, academic points, teaching expectations, ITERs, TESs, POWER, MedSIS, promotions, Department of Surgery structure, etc. George Christakis & Ron Levine.

**3:00 – 3:30** Division specific meetings:
Division of General Surgery (Terrace Room, 2nd Floor)
Division of Cardiac Surgery (St. George Room, 3rd Floor)

# ORAL PRESENTATIONS

## Oral Presentation 1: Determining Construct Validity of Virtual Reality Spine Simulation Modules

**Monica Liu**
UHN-Toronto Western Hospital

**Introduction:**
Ultrasound assessment of the spine prior to neuraxial anesthesia is being increasingly used in anesthesia practice. It improves the success of spinal and epidural anesthesia, especially for patients with underlying difficult anatomy [1,2,3]. This new application has posed a challenge to educators, as new knowledge and skills must be taught. To assist with the teaching and learning of ultrasound guided neuraxial anesthesia we have created an online interactive educational module (http://pie.med.utoronto.ca/vspine or http://www.usra.ca/vspine.php). This module consists of two components: 1) spinal anatomy, and 2) sonoanatomy. Our study aimed to determine construct validity of our virtual reality lumbar spine simulation modules.

**Materials and Methods:**
After obtaining local research ethics board approval and written participant consent, fourteen anesthesia trainees with no prior experience with spine ultrasound imaging were included in this study. Construct validity was assessed using a pre-test/post-test design to measure the knowledge acquired from self-study of the virtual spine simulation modules. Two tests (A and B) with 20 multiple choice questions were used for the pre- and post-tests. The tests had previously been locally validated on 5 novices and 5 experts (mean scores were 50% for novices and 80% for experts). Tests A and B were used either for the pre- or post-test, at random in order to account for possible differences in difficulty between the two tests. These tests were administered immediately before and after a 1-hour training session using the virtual reality spine simulation modules.

**Results:**
Fourteen anesthesia trainees completed the study. Seven used test A as the pre-test (Group A) and seven used test B as the pre-test (Group B). Both groups showed a statistically significant improvement ($p<0.05$) in knowledge after a 1-hour session with our virtual reality spine simulation modules. The mean score on the pre-test was 55% +/- 11.2, and the mean post-test score was 77% +/- 8.7.

**Discussion:**
Our results suggest that a 1-hour practice session using the online interactive virtual spine simulation modules significantly improves the knowledge of spinal anatomy and sonoanatomy of anesthesia trainees.

**References:**
1. Grau et al. J Clin Anesth. 2002 May; 14(3):169-75.
2. Grau et al. Reg Anesth Pain Med. 2001 Jan-Feb; 26(1):64-7.
3. Chin et al. Anesthesiology. 2011 Jul; 115(1):94-101.

## Oral Presentation 2: Low cost 3D printed ballistics gel heart phantom to train in transesophageal echocardiography

**Giuliamaria Ruggeri**

UHN-Toronto General Hospital

**Background:**
Acquiring the skills necessary to perform trans-esophageal echocardiography (TEE) requires training with probe manipulation and image acquisition. Use of on line 3D models helps trainees better understand the relationships between anatomical structures of the heart but hands-on experience is still mostly acquired on patients. Commercial training simulators exist, but are very expensive and are not always derived from patient data.

**Aim:**
We develop a low-cost ultrasound phantom based on cardiac Ct using 3D printing and ballistics gel. We then tested the quality and accuracy of TEE images obtained from ballistics gel model.
Materials and Methods: Images from a CT dataset were segmented to isolate patient myocardium to create virtual 3D model of the heart and subsequently 3D printed with nylon as a mock-up. Commercially available synthetic ballistics gel was heated to 130 degrees Centigrade until liquefaction when the 3D printed model was submerged and the solution was allowed to cool to room temperature. Once solidified, the 3D print was carefully removed leaving the internal cast of the heart intact.

**Results:**
Nine standard TEE views were acquired scanning the model arranged in a warm water-filled container. The views were recorded and assessed by two independent certified echocardiographers. They were deemed accurate and of adequate quality. Total raw materials cost for the model was approximately $10.00 USD and took approximately 36 hours to produce.

**Conclusion:**
Low cost 3D printing allows creation of scannable gel heart model as an accurate TEE phantom. Future steps are to compare it with the gold standard commercially available TEE gel phantoms. With this technique it is possible to create different heart phantoms from CT scans representative of various pathologies. This would allow training on image acquisition and optimization in various clinical scenarios.

## Oral Presentation 3: Enhancing Anesthesiology Trainee Performance in Critical Events using Cognitive Aids

**Asad Siddiqui**
The Hospital for Sick Children

**Introduction:**
Crises in the operating room (OR) during a pediatric case are fortunately rare with the incidence of cardiac arrest in non-cardiac patients being 2.7/10000(1). This rarity means that increasingly few anesthesiologists can claim personal experience of the full range of potential OR emergencies. In order to address this, the Society for Pediatric Anesthesia developed cognitive aids(CAs) in the form of Critical Event Checklists (SPA CECs). Several studies have demonstrated the benefit of CAs in improving adherence to guidelines, performing critical tasks and improved Anesthesia Non-Technical Skills (2,3). However, despite the presence of CAs, individuals often do not use the aids frequently or use them incorrectly(4,5). The way that trainees utilize CAs can potentially be augmented through improved education/orientation surrounding the tool. The objective of the study was to investigate whether the presence of SPA CECs improve the performance of anesthesiology trainees during simulated critical events.

**Methods:**
IRB approval was attained from the local institution. A randomized, 2 x 2 factorial design was used. Subjects were randomized twice. The first randomization was whether the SPA CEC was available to the participant during the simulations. The second randomization was the mode of orientation (e-module vs. didactic). The simulations were videotaped and rated by two Pediatric Anesthesiologists using the Managing Emergencies in Pediatric Anesthesia (MEPA) scenario specific checklist and global rating scale (GRS).

**Results:**
A total of 78 MEPA simulations were conducted in Anesthesiology Residents. Results demonstrated that a cognitive aid was used in 17.9% of simulated scenarios. A cognitive aid was used in 44.8% of diagnosis-based scenarios (malignant hyperthermia(MH)/local anesthetic toxicity(LAST)/anaphylaxis) and in 2.0% of problem-based scenarios. In the MEPA simulations, there was a significant difference in the GRS score between participants that used the CA (M=3, SD=1.27) and participants that did not use a CA (M=2.43 , SD=0.89) (p=0.048).

**Conclusions:**
The results of this study suggest that the uptake of CAs is poor; however, they are predominantly utilized in diagnosis-based scenarios (i.e. MH/LAST). When CAs are utilized, they enhance performance of trainees in a simulated environment on the GRS by an average of 0.57. This is equivalent to that of an extra 20 months of anesthesia training based on a prior MEPA study(6). The significance of these results indicates that education surrounding the utilization of CAs should be a necessary competency during Anesthesiology Residency Training as it can enhance the performance of trainees in critical events.

**References:**
1. Morray J et al. Anesthesiology 2000;93:6-14.
2. Arriaga AF et al. N Engl J Med 2013;368:246-53.
3. Marshall SD & Mehra R. Anaesthesia 2014;69:669-77.

4. Bould MD et al. Br J Anaesth 2009;103:570-5.
5. Nelson KL et al. Simulation in Healthcare 2008;3:138-45.
6. Everett T et al. unpublished data (manuscript submitted) 2016.

## Oral Presentation 4: Tackling a $600,000 problem - Improving Emergency Theatre Utilisation

**Kim Wild**
UHN-Toronto Western Hospital

**Background:**
The dedicated emergency theatre at a busy tertiary hospital had significant list-start delays. 95% of the time, the emergency theatre stands empty at 08:00. With 14 (median) patients waiting on the list at 08:00, a prompt start is imperative. Out of hours, a "life or limb" policy operates. Idle time reduces case-throughput, increasing: costs, bed demands in a hospital operating close to full capacity, and most importantly waiting times for unwell patients,

**Methods:**
Data was audited (11/2014-10/2015), analysing: delay times from 08:00 and delay reasons. A cost analysis was conducted. Stakeholders were engaged to explore their perception of the problem.
A "Gold Case Protocol" was introduced (from 30/03/2016) – identification and preparation of the first case the preceding night for an 08:00 start. The on-call general surgical rota was altered to provide cover from 08:00. Theatre data was then re-audited (from 30/03/2016 onwards) and results compared with the previous year.

**Results:**
Principal causes for the list-start delay were: patient not prepared (54%) and surgeon unavailable (26%). Following introduction of the Gold Case Protocol, median time to list start was reduced from 66 minutes (IQR 39-105) in 2015 to 30 minutes (IQR14-50) in 2016 (April to August). Overall, the daytime usage of theatres between 8AM and 8PM increased from 67% (71544 minutes) to 85% (85369 minutes). A total of 1007 cases were completed in emergency theatres over 5 months in 2016, compared to 945 in the same period in 2015.

**Conclusions:**
The fixed cost of emergency theatres is approximately $28/minute. With a delay of 66 minutes each day, this costs over $600,000/year. The estimated cost saving achieved through decreased theatre idle time alone is over $300,000. Most importantly, the increased utilisation means that more sick patients are having their urgent surgery each month.

# POSTERS

## Poster 1: Can Simulation Help our Medical Students "Choose Wisely"?

**Thiago Appoloni Moreira**
St. Michael's Hospital

**Background:**
Recently there has been a shift in Canada's health care philosophy towards "less is more". Choosing Wisely (CW) Canada (1) is part of a global campaign to help physicians and patients engage in conversations about unnecessary tests, treatments and procedures. Educators must implement CW early in the curriculum to promote learners developing patient-centered management plans (2,3). Traditionally physicians have ordered multiple tests prior to "routine" surgery. These may be unhelpful, non-evidence-based, and lead to more tests with the potential for unnecessary harm. As Anesthesiologists, we are "gatekeepers" for elective surgical patients. Ideally patients are seen 2-3 weeks for optimization. CW has collaborated with the Canadian Anesthesiologists Society to develop a list of "Five Things Physicians and Patients Should Question." One of these is a Chest X-ray (CXR).

**Summary of Work:**
We highlighted this to 250 University of Toronto medical students during core Anesthesia Simulation. To keep costs down, we customized our existing pre-operative scenario. Students extract the history from a Standardized patient (SP). Based on examination findings, students justify appropriate investigations. Competition is introduced and teams who choose CXR automatically lose points. This is where the discussion becomes rich and heated! Finally, teams explain their rationale to the SP.

**Learner Feedback:**
Among the answers to" What will you take away from this to apply to your practice?" our learners specifically commented "investigation selection", "Choosing Wisely" and "don't order unnecessary tests!"

**Impact:**
Introducing the concepts of CW in anesthesia rotation curriculum, we encourage the discussion about the best way to proceed, contemplating patient safety and responsible resources usage. This process shifts away from generalized protocols for groups of patients, towards individualized approach.

**Take home messages:**
Implementing CW in undergraduate medical education targets a grassroots' change in culture necessary for transformation.

**References:**
1. Levinson W, Huynh T. Engaging physicians and patients in conversations about unnecessary tests and procedures: Choosing Wisely Canada. MBA CMAJ. 2014; 186(5): 325–326.
2. Cooke M. Cost consciousness in patient care - what is medical education's responsibility. N Engl J Med. 2010; 362:1253-55.
3. Weinberg SE. Providing high-value, cost-conscious care: A critical seventh general competency for physicians. Ann Intern Med. 2011; 155:386-388.

## **Poster 2:** The Managing Emergencies in Pediatric Anesthesia (MEPA) Global Rating Scale is Reliable and Valid for Simulation-based Assessment in Anesthesia: An International Multicentre Study

**Dr. Tobias Everett**
The Hospital for Sick Children

High-stakes simulation-based assessment of physician competence is already established in some jurisdictions. In 2015, The Royal College of Physicians and Surgeons of Canada moved to "Competence by Design", which includes simulation milestones. Building on our previous work in this field, we conducted an international multi-centre validation study of simulation-based assessment tools in anesthesia as applied to a full range of anesthesia practitioners, from junior residents to veteran Staff. Our objective was to provide arguments for the reliability and validity of our scenarios and instruments in this context, and be able to generalize to a broader context.

**Methods:**
Nine centres recruited participants to engage in an established simulation course which covers seven high-stakes, low-frequency operating room crises. 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. Multiple linear regression was applied to demonstrate impact of co-variates.

**Results:**
Over an 18-month period, we collected data on 469 simulation encounters. 140 videos were rated by all the raters. The overall intraclass correlation coefficient for the CL was 0.96 and for the GRS was 0.91 ($p<0.001$). 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 are not) shows excellent reliability. When stratified by grade there was a statistically significant improvement in performance scores between junior residents, senior residents and staff. Senior staff did not outperform junior staff indicating a ceiling effect.

**Conclusion:**
Our GRS has been adopted as the principal outcome measure for the Canadian National Anesthesia Simulation Curriculum and is being integrated into assessment of anesthesia residents in Canada. This study provides further validity evidence for its use in this manner. The nature of the scenarios and tools are not unique to our context and our conclusions can therefore be generalized to performance assessment across anesthesia, in postgraduate training and independent practice.

## Poster 3: Beyond a good story: from Hawthorne Effect to reactivity in healthcare research

## Elise Paradis

Observational research is increasingly being used in healthcare research, yet it is often criticised for being prone to observer effects (also known as the Hawthorne Effect), defined as a research participant's altered behaviour in response to being observed. This presentation explores this concern. First, it briefly reviews the initial Hawthorne studies and the original formulation of the Hawthorne Effect, before turning to contemporary studies of the Hawthorne Effect in healthcare research and beyond. Second, using data from two observational studies (in the operating theatre and in the intensive care unit), it investigates the Hawthorne Effect in healthcare research. Evidence of a Hawthorne Effect is scant, which is surprising given the foundational nature of the Hawthorne Studies in the social sciences and the prevalence of our concern with observer effects in healthcare research. Moreover, the multiple and inconsistent uses of the Hawthorne Effect have left researchers without a coherent and helpful understanding of research participants' responses to observation. The authors' research illustrates the complexity of observer effects, suggests that significant alteration of behaviour is unlikely in many research contexts, and shows how sustained contact with participants over time improves the quality of data collection. This presentation concludes with three recommendations to improve the quality of observational research, and suggests that the term 'participant reactivity' better reflects current scientific understandings of the research process and highlights the cognitive work required of participants to alter their behaviour when observed.

## Poster 4: A simulation-based rounds curriculum for residents

**Dr. Katherine Marseu**
UHN-Toronto General Hospital

Simulation-based education has become a useful learning and assessment technique in medical education, and in Anesthesia specifically. Our institution has conducted weekly Simulation Rounds for residents for several years, focusing on the management of critical events. These rounds have routinely been evaluated by residents as a high point of their rotation and unique among other training sites. However, we have encountered several issues with these rounds: difficulty finding regular faculty to teach sessions; the burden of work to create new scenarios; little communication between faculty about scenario topics such that there may be overlap from one week to the next; and no structure or logical flow to the scenario curriculum. Thus, we embarked on a project to renew our simulation program. We conducted a needs assessment to determine which subspecialty areas and topics to include by: reviewing the Royal College Postgraduate National Curriculum and U of T Residency Training Objectives; determining which cases are rare in actual clinical practice, but critical to manage correctly; and asking residents about which cases they have lacked experience in during their training. Additionally, we focused on the subspecialty areas that our site will be responsible for with the introduction of the Competence by Design Curriculum to our Program: Vascular, Cardiac, Thoracic, and Transplant Anesthesia. We have used this information to develop an organized and structured simulation curriculum for residents that flows logically from one week to the next over the course of their rotation, and builds on their skills. We have also developed several documents to be used in conjunction with the curriculum: a scenario schedule for each rotation; a confidentiality agreement for all participating trainees; an orientation to the simulation center and simulation curriculum; a pre- and post-curriculum survey to compare what skills residents have and/or hope to develop regarding simulation at the beginning of the rotation, versus what they have acquired by the end; an evaluation form for supervising faculty to fill out for the participating resident each week; and an evaluation form for the residents to fill out on the session and faculty leading it each week. We have also created a blank scenario template that can be easily used by any faculty for the generation of new scenarios in the future. Though the primary goal of this program is for current resident education, other future steps include using it to conduct simulation research, and possible application for Royal College accreditation.

## Poster 5: Combination of anesthesia and surgical undergraduate medical curricula, to form an integrated perioperative curriculum

**Natalie Clavel**
UHN-Toronto Western Hospital

**Background:**
Knowledge and skill atrophy, represent a significant challenge in undergraduate medical education due to intermittent and/or brief clinical exposures in anesthesia, and certain surgical subspecialties. We sought to increase clinical exposure for career planning purposes, to create high-value integrated clinical opportunities for skill and knowledge consolidation, to facilitate longitudinal follow-up of surgical patients, and to increase overall student exposure to surgical and anesthesia preceptors by implementing a longitudinal, integrated perioperative clinical experience at a large urban academic hospital.

**Innovation**:
Students are provided with a patient-centered perioperative clinical experience, with a focus on multidisciplinary preoperative, intraoperative and postoperative patient management. This intervention was piloted in the longitudinal clerkship stream, at the University of Toronto (N=7).

**Student schedules are created with the following principles in mind:**
1) Early exposure to surgery and anesthesia is clinic-based to orient the student to the specialty, and facilitate identification of patients for longitudinal follow-up
2) Late exposure is mixed (clinic and OR) to facilitate student attendance during identified surgical procedures and/or postoperative visits
3) Scheduling of anesthesia and surgery preceptors as a working pair, when an undergraduate student is present in the OR.
4) Mandatory postoperative follow-up of surgical patients during surgical rounds and acute pain service rounds.
5) Longitudinal (year-long) follow-up of complex patients is encouraged, during which students appreciate the complexity of the patient journey and become patient advocates.

Implementation was enabled by flexible anesthesia preceptor scheduling and strong engagement by students and preceptors. This initiative was labour intensive from an administrative perspective.

**Take-home Messages:**
The integration of anesthesia and surgical subspecialty clinical experiences has led to an increase of approximately 40%, in clinical exposure of students to perioperative specialties. Involved preceptors and students, report very good to excellent satisfaction with the new combined curriculum delivery method.

# Poster 6: Hands-On Small Group Sessions Using Ultrasound to Tech Anatomy in Medical School

**Adrian Koziak**
Sunnybrook Health Sciences Centre

**Background:**
The integration of ultrasound into the undergraduate anatomy curriculum at UofT has expanded and is now in its 4th year. It aims to integrate the use of ultrasound into the undergraduate curriculum for medical students in small-group interactive sessions and then evaluate its effectiveness through student feedback. We present feedback from one of the 3 sessions held for first year medical students last year

**Methods:**
During the 2015 winter term, 3 interactive hands-on teaching sessions were delivered to first year medical students attending the University of Toronto. Session topics included: Cardiac/Lung; Abdomen/Pelvis & Brachial Plexus/Neck. We present feedback from the Brachial Plexus/Neck Sonoanatomy session. Tutors included multidisciplinary faculty experienced in the used of point of care ultrasound. This session included staff, fellows, and residents from the departments of Anesthesia, Intensive care, Emergency Medicine, Otolaryngology and Internal Medicine. Each small group of students participated in 2 interactive sessions that included a synopsis of basic ultrasound imaging principles, demonstration of anatomical structures in the neck and brachial plexus using an ultrasound machine on volunteers, practice scanning and identification of structures on volunteers by students. After each session, students gave feedback using scaled assessments rating both the instructor and the seminar.

**Results:**
Five hundred and eight questionnaires were returned (90.7% response rate). Tutor ratings were very good or excellent, with an overall average rating of 4.74 representing very good to excellent instruction. In addition, the seminar itself was rated as very good or excellent, with an overall rating of 4.73/5. Conclusions: Ultrasound can provide real-time bedside information in a minimally invasive fashion and has become widely used as a diagnostic technique in modern clinical practice 1. However, interpretation of ultrasound images is partly a matter of pattern recognition 2. Early exposure to ultrasound would therefore be valuable to medical trainees to facilitate an appreciation of the ultrasound appearance of normal anatomy. Learning in small-group environments has been shown to be beneficial to undergraduate students 3. This project provides evidence that teaching modern medical trainee's anatomy with ultrasound in hands-on sessions elicits positive feedback.

**References:**
1.Harmon DC et al. 2008. Perioperative Diagnostic and Interventional Ultrasound. 1stEd. Philadelphia: Saunders Elsevier. p 89.
2.Chin et al. 2011. Ultrasonography of the Adult Thoracic and Lumbar Spine for Central NeuraxialBlockade. Anesthesiology114: 1459-85.
3.Springer L et al. 1999. Effects of small-group learning on undergraduates in science, mathematics, engineering, and technology: A meta-analysis. Review of Educational Research. 69:21–51.

## Poster 7: Factors influencing fellowship training and a future research career

**Doreen Yee**
Sunnybrook Health Sciences Centre

**Introduction:**
Recent data suggests that graduating physicians are becoming less interested in an academic career.1 Within anesthesia, there has also been a documented decline in both basic and clinical research over the last two decades.2 It has been proposed that fostering resident interest in fellowship training and research can promote future academic physicians. This study aimed to determine preferences of Canadian anesthesia residents towards fellowships, academic practice, and future research activities and elucidate factors that affect those preferences.

**Methods:**
After REB approval, an anonymous online survey was sent to all anesthesiology residents currently enrolled in a Canadian residency program. Demographic information, data on fellowship training, practice setting, and research were collected. A multivariable logistic regression model was used to determine significant factors associated with the career decisions.

**Results:**
44% (n=244) of residents with a mean age of 30 years responded. 14.3% possessed a Master's degree and 4.5% a PhD. 70% of residents indicated that they plan on pursuing fellowship training. The most popular fellowships were Regional (34.1%), Critical Care (32.3%), and Acute/Chronic Pain (25.0%). Enhanced employability, personal interest, and desire for an academic career were the factors that influenced doing a fellowship. Male gender was a positive predictor for a resident`s decision to pursue a fellowship (adjusted odds ratio (OR) 1.87, 95% CI 1.03 to 3.40, $p = 0.04$), while presence of a graduate degree was a negative predictor (adjusted OR 0.52, 95% CI 0.30 to 0.91, $p = 0.02$). 57% of residents preferred to work at an academic institution upon graduating. Less than half of the 70% of residents currently involved in research indicated a desire to incorporate research into their future practice. Lack of interest, experience and lifestyle demands were top factors most influential in the decision to not pursue research after residency. Current research activity (adjusted OR 3.50, 95% CI 1.56 to 7.90, $p = 0.003$) and publishing while in residency (adjusted OR 4.40, 95% CI 2.02 to 9.56, $p < 0.001$) were the only significant factors associated with the intention of future research activities.

**Conclusions:**
Although the majority of Canadian anesthesia residents intend on pursuing fellowship training, only a third intend on pursuing research activities after residency. Several factors have been identified that influence an anesthesia resident's decision to pursue a fellowship, academic practice, or future research. Initiatives to promote future research activities should focus on promoting interest and exposure to research while in residency.

## **Poster 8:** Exploring self-regulatory processes in anesthesiologists during a simulated crisis scenario: a psychometric study

**Maya Contreras**
St. Michael's Hospital

**Background:**
Self-regulation (SR) has been shown to be central to expert performance. SR has three phases: forethought, performance and self-reflection. Substantial evidence attest that individuals who express more specific goals, plans, and possess higher level of self-efficacy during the forethought phase of SR perform better in a wide range of academic and non-academic domains. However, it is unknown how physicians self-regulate in the clinical environment. Our primary aim was to validate scores on instruments assessing forethought and performance in a simulated crisis scenario. Secondary aims were to investigate the correlation between forethought and performance and to design prompting questions as an intervention tool for a subsequent study.

**Methods:**
REB approval was obtained. Six anesthesiologists participated in the exploratory study (staff=3, PGY5=1, PGY2=2) to design instruments and prompting questions. Eighteen anesthesiologists participated in the validation study (staff=6, PGY5=6, PGY2=6). Participants were randomized to either receiving an open ended question (Group A) or prompting questions (Group B). Participants were then cued about a trauma scenario and were instructed to report their forethought. Subsequently, participants were asked to manage a simulated scenario and were debriefed. We also conducted an interview to obtain data about participants' experience. Interviews and video recordings were then analyzed. Messick's validity framework was used to collect evidence for interpretation of scores for forethought and performance. Content evidence was supported by the exploratory study. Internal structure evidence was supported by inter-rater reliability, internal consistency, and correlation between mean item scores and global rating scale (GRS). Relation to other variables included level of expertise; content analysis was performed to support response process evidence. Correlation between performance and forethought, and the effect of prompting on forethought scores were determined.

**Results:**
Overall consistency and agreement for forethought and performance were very good (consistency: 0.78, 0.81; agreement: 0.74, 0.79). Cronbach's α was 0.87 for forethought and 0.79 for performance. Mean item scores and GRS correlated strongly (Pearson's correlation (r): 0.92; 0.95). There was no significant difference among PGY2, PGY5 and Staff scores on instruments. There was no strong correlation between forethought and performance (r: 0.25). Prompting questions resulted in significantly higher forethought scores (p: 0.027).

**Conclusion:**
This is the first time that a measurement tool has been developed to measure forethought processes in anesthesiologist. Our initial results confirm the validity of scores on forethought and performance. Prompting questions induced superior metacognitive processes which can be used as an intervention in our future study.

## **Poster 9:** Airway Ultrasonography Training Improves Percutaneous Identification of the Cricothyroid Membrane

**Eric You-Ten**
Sinai Health System

**Background:**
Ultrasonography provides a direct visualization of neck landmarks and significantly improves accuracy in identifying the CTM, a crucial landmark when performing a cricothyrotomy. While ultrasound is not feasible during an emergency cricothyrotomy, finger palpation remains the only option to quickly identify the CTM. However, this method is blind and frequently incorrect with an accuracy ranging from 0 - 35%. We hypothesize that direct visualization using ultrasound may lead to a better understanding of anatomical neck landmarks and hence may improve the accuracy of identifying the CTM using percutaneous(finger) palpation. This study proposed to determine the role of ultrasound-guidance of neck landmarks on the accuracy of percutaneous identification of the CTM.

**Methodology:**
Following IREB approval and informed consent, anesthesia fellows, residents (PGY1-2) and anesthesia assistants from Mount Sinai Hospital were randomized to Palpation (PT, n=7) and Ultrasound (US, n=8) group. All participants underwent a pretest training consisting of a didactic PowerPoint lecture of neck landmarks, followed with practice on volunteers. Participants in the US group would practice palpating the neck landmarks at least 5 times under US-guidance with direct visualization and identification of the CTM and cartilages. The PT group also practiced palpating the neck landmarks, however, without the guidance of ultrasonography. One hour later, participants in both groups would palpate the neck landmarks of ten volunteers and mark the midpoint of the CTM using a water-soluble marker. Only volunteers with moderate, difficult and impossible neck landmarks were recruited. Prior to the assessment of the participants, the midpoint of the CTM of each volunteer was confirmed by two expert anesthesiologists using ultrasonography and marked with a waterproof invisible ultraviolet marker. The primary outcome is the distance between the US and finger palpation points (US-FP distance in mm). Secondary outcomes were accuracy of finger palpation defined as a US-FP distance ≤ 4 mm.

**Results:**
A total of 61 and 80 palpation attempts were performed by the PT and US group, respectively. The mean US-FP distance of the PT group was significantly greater than the US group (9.0±6.3 vs 5.1±4.3 mm, , $p<0.0001$, Student t-test). The US group was significantly more accurate ($p=0.004$, Fisher exact test) by three-fold (Odds ratio 2.9, $p=0.003$) than the PT group.

**Conclusion:**
Training in ultrasound-guidance identification of neck landmarks improves percutaneous identification of the CTM in volunteers with moderate to impossible neck landmarks, suggesting that ultrasound is an important training modality in airway management of “cannot intubate-cannot oxygenate”.

## **Poster 10:** A survey of Canadian anesthesiologists and residency program directors assessing education in environmental sustainability

**Maria Petre**
Sunnybrook Health Sciences Centre

**Introduction:**
Anesthesia related waste represents 25% of all operating room waste and anesthesiology practice is a known major contributor to environmental waste and global warming. The aim of this study is 1) to ascertain current educational efforts at the residency level on the topic of environmental sustainability in anesthesia and 2) to determine perceived gaps by practicing anesthesiologists.

**Methods:**
With REB approval, Canadian anesthesiology residency program directors completed a 13-question electronic survey ascertaining the content and format of any formal curriculum regarding environmentally-sustainable anesthesiology practice, and any future plans for, and perceived barriers to, developing curricular content on this topic. A second survey was emailed to all Canadian Anesthesiology Society (CAS) members, including residents. The instrument consisted of 24 questions ascertaining current environmentally sustainable practices in anesthesiology and perceived gaps, barriers and interest in gaining further knowledge on this topic.

**Results:**
The response rate for the program directors' survey was 41.2% (7/17). Of these only 2 programs (28.5%) had a sustainability curriculum; however 85.6% indicated that residents would benefit from more teaching in this area. The identified barriers to the implementation of such a curriculum included a lack of faculty expertise, time within structured curriculum, and institutional support. The CAS survey response rate was 15.8% (426/2695) of whom 15.1% were residents. Despite a willingness to recycle at work among most anaesthesiologists (94.8%), only 30.3% did so, with many engaging in other sustainability efforts included evening shut-off of anesthesia equipment, appropriate segregation of biohazardous and nonhazardous waste and choosing anesthetic gases based on their environmental footprint. Inadequate information/education was identified by 62.7% of respondents as a major barrier to recycling and sustainability efforts in the OR with as many as 69.1% of respondents indicating an interest in obtaining further education on the topic.

**Conclusion:**
Our results outline current educational efforts on the topic of sustainability in anesthesiology residency program curricula across Canada and highlight the current attitudes, gaps and barriers to environmentally sustainable anesthesiology practice. This study may help inform the development of a cross-Canada collaborative residency curriculum in this field and identifies opportunities for knowledge translation.

## **Poster 11:** Introducing the Early-Stage Anesthesiology Scholars

**Sinziana Avramescu**
Sunnybrook Health Sciences Centre

Academic anesthesia is essential for the continued advancement of our specialty. Unfortunately, several studies have shown declining interest in academic career paths across medical disciplines and anesthesia is no exception. Transitioning from early-stage researcher to mid-career funding sources has been identified as a key limiting step in the development of successful academic anesthetists.

In an effort to facilitate the professional development and retention of young anesthesia scholars in academic-oriented career tracks, we founded the Early-Stage Anesthesia Scholars (eSAS). This international interest group is spearheaded by early-career anesthesiology scholars passionate about advancing the science of our specialty. The mission of eSAS is to serve the interests of early-career scientists and provide an academic home for developing anesthesiology scholars. We foster peer and senior mentorship, in both career and scientific topics; we aim to enhance peer networking and collaborative opportunities and to develop strategies that reduce the attrition of motivated scholars at all career stages. The eSAS is governed by the Executive Council, made up of 16 voting members. Members of our Department of Anesthesia at the University of Toronto are leading the International branch of this organization. Mentorship and support is provided by a group of senior academic anesthesiologists who are part of the Advisory Council and by leading anesthesiology organizations, including the International Anesthesia Research Society (IARS), the Association of University Anesthesiologists (AUA) and the Foundation for Anesthesia Education and Research (FAER).

Our first meeting was linked to a very successful inaugural Scholars' Program, a series of talks at the 2016 Meeting of the IARS, targeted directly to the early-career scientists in anesthesia. After its foundation in May 2016, the eSAS team set-up a website (http://www.esashq.org) that provides updates on upcoming scientific meetings and events, information about education and research training in anesthesia, discussion forums on important topics and a centralized method to apply for free membership. The profile of our group is increasing exponentially in the anesthesia community. We were able to attract over 80 members from all over the world in less than a month and we also organized our first eSAS networking event at the 2016 Meeting of the American Society of Anesthesiologists.

We will continue to promote peer networking and collaborative opportunities for early-career anesthesiology scholars. Our goal is to develop and implement strategies to support retention of anesthesiology-scientists in a research-oriented career track.

## Poster 12: The impact of a on line lung Ultrasound Module in learning basic lung point of care ultrasound

**Massimiliano Meineri**
UHN-Toronto General Hospital

**Background:**
Lung Ultrasound is becoming standard of care in acute care and perioperative setting. An International consensus statement recommends the use of lung ultrasound to identify Pleumothorax, pleural effusion, interstitial syndrome and consolidation. Lung Ultrasound in an invaluable tool at the bedside and allows identification of pneumothorax and pleural effusion with a highest sensitivity and specificity of traditional chest X ray. Training in lung Ultrasound requires understanding of ultrasound physics, sonographic anatomy and pathological patterns.

**Aim:**
We developed a on line module to teach basic lung ultrasound, including the identification of pneumothorax and pleural effusion.

**Materials and Methods:**
We developed rotatable three dimensional model of the chest based on a publicly available Ct scan (OsyriX repository). The three dimensional model was cut along the standard lung Ultrasound planes. We also developed animations to match real ultrasound images. Real ultrasound image were obtained with different probes on a normal patient, in a case of right pneumothorax and left pleural effusion. The module contains an introduction, text explaining the image seen, interactive rotatable 3D Chest model and standard ultrasound images.

**Results:**
The model published on a secured server (http://pie.uhnresearch.ca/~michaelcorrin/pocus/demo/)and assessed for accuracy during and after the completed development by three expert intensivists trained in point of care ultrasound. A pre post test comprising 25 question including 15 clips of normal and pathology was administered to 24 anesthesiologist with previous minimal experience in preparation of an hands-on ultrasound course. The pre score was and average of 52.6 % and the post test was 73.6% of correct answers.

**Conclusion:**
The Basic lung ultrasound module seamed an accurate and complete module to learn basic lung ultrasound. In a small cohort of learners demonstrated improvement of knowledge. This should be demonstrated in a larger and more homogeneous cohort in a controlled environment. Its impact on scanning learning curve should also be investigated.

## **Poster 13:** Rapid Cycle Deliberate Practice in Medical Education - A Systematic Review

**Jillian Taras**
Hospital for Sick Children

**Objective:**
Rapid Cycle Deliberate Practice (RCDP) is a novel simulation-based education model that is currently attracting interest, implementation, exploration and research in medical education. The objective of this systematic review is to examine the literature and summarize the existing knowledge on RCDP in simulation-based medical education (SBME).

**Methods:**
We included published and non-published materials on RCDP. The authors independently screened the references identified by the search strategy. One author performed the data extraction and both authors independently assessed the resources for eligibility.

**Results:**
Fifteen resources met inclusion criteria; three published resources and twelve non-published resources. The identified materials were diverse and heterogeneous, such that we did not perform a quantitative synthesis of the results or meta-analysis. We reviewed the current status of RCDP research, focusing on strategies, techniques and outcomes and identified gaps in understanding to guide future research. All resources described RCDP in a similar manner: maximizing time in deliberate practice, providing learners with multiple opportunities to practice the right way, using directed feedback within the scenario rather than lengthy debriefing after the scenario and aiming to achieve mastery learning. Strategies and techniques common to the resources identified were: splitting traditional simulation cases into smaller segments, micro debriefing or feedback in the form of 'pause, debrief, rewind and try again' and providing progressively more challenging cases to learners as they achieved mastery. A variety of outcome measures were used by the studies identified including: scoring tools (STAT, MCAF, NRPE, DASH), assessment of procedures using checklists or video review, qualitative assessments (surveys using Likert scales, general evaluations), clinical reports and time to active skills.

**Conclusions:**
Outcome measures reported are limited and inconsistent. As well, there is an absence of data on retention after RCDP teaching, on RCDP with learners from specialties other than pediatrics and on RCDP for adult resuscitation scenarios. We have identified important avenues for future research on RCDP.

## Poster 14: Preventing & Managing Chronic Postsurgical Pain with a Patient-Driven Mobile Platform

**Abid Azam**
UHN-Toronto General Hospital

**Background:**
Moderate-to-severe chronic postsurgical pain (CPSP) develops in between 5 and 10% of patients one year after major surgeries, causing significant pain-related distress and disability. After hospital discharge, patients are commonly prescribed opioids for postsurgical pain relief which can lead to adverse effects such opioid-induced hyperalgesia, withdrawal symptoms (e.g. muscle aches, cramping), and opioid dependency. The negative sequelae of postsurgical pain can be prevented through communication and intervention by pain specialists in the critical 3-month period after surgery. Unfortunately, most patients are too ill or physically limited after surgery to access pain management services, creating needless suffering and raising risks for CPSP and opioid misuse.

**Methods:**
The Transitional Pain Service (TPS) is a hospital-integrated, multidisciplinary pain clinic with the mission of preventing and addressing the growing health problems of CPSP and opioid misuse. The TPS is implementing a cutting-edge mobile app and digital platform, Manage My Pain, into its clinical workflow to enable patients to track and report their pain-related symptoms (e.g. pain intensity, interference, medication use) to their care team remotely. The Manage My Pain platform has developed a customized clinician's portal that is capable of flagging clinically significant trends and generates summary reports that capture key metrics needed by clinicians from multiple disciplines (including anesthesiology, nursing, psychology, and physiotherapy).

**Results:**
Manage My Pain currently has over 23,000 users with over 480,000 pain records captured to date. It is currently being used in a clinical trial at a major hospital and is trending to deliver 75 times more patient-reported outcomes than current paper-based questionnaires. We will outline our strategy for measuring the impact of deploying Manage My Pain at the TPS by using key clinical outcomes, including patients' reports of pain intensity, opioid use, and functioning.

**Future Directions:**
By evaluating our program and validating our outcomes, we aim to support large-scale expansion and implementation of our novel service to other perioperative pain clinics and healthcare institutions.

## Poster 15: Virtual Reality for educating and reducing preoperative anxiety in children – design, face validity and acceptability by healthcare

**Ben O'Sullivan**
The Hospital for Sick Children

Preoperative anxiety in children continues to be challenge for anesthesiologists with 40 to 60% of children experiencing considerable preoperative anxiety and distress. The prevention of preoperative anxiety in children is important to reduce psychological trauma and sequelae related to anxiety. Virtual Reality offers an immersive experience that may assist with reduction of anxiety in children. However, such technologies need to be assessed for realism and acceptability by both healthcare professionals, patients and their parents. The aim of our study is to investigate the usability and acceptability of virtual reality for preparation children for the operating room.

**Methodology:**
Following ethics approval, we designed a virtual operating experience exposing children to the operating room to assist with reduction of anxiety. The concepts in the VR experience were developed in collaboration with our hospital's ChildLife department. Using accelerated rapid cycle development framework, we evaluated the level of realism, acceptability, and motion side effects. We targeted staff and used an iterative sampling method to improve the design of the VR experience for children.

**Results:**
58 staff (65% female) at the Hospital for Sick Children reviewed and completed the Virtual Reality Experience. Staff were from across many disciplines including physicians – 15%, Nursing 15%, Childlife 30%. It was the first experience for 90% of participants to use VR in the healthcare setting with 60% never having prior experience altogether. 97% (95% CI, 97.6-98.6)of participants rated the VR experience as very realistic, 100% rated it as highly useful for children at SickKids. The first iteration had a motion sickness rate of 8% and the final version is 1% (following feedback and design changes). There was a high intent to use with 100% (58/58) of participants saying they would recommend the VR experience to their patients if age appropriate. The amount of information portrayed was assessed to be adequate by 80% (95%CI, 81.3- 85.4) of participants

We are currently assessing the acceptability of this iteration among children and their parents and will report these finds at the conference.

**Conclusions:**
We have demonstrated that virtual reality is a valid and acceptable form of preparing children for the operating room experience. Using a scientific method to develop and validate these tools is essential for wider acceptability. We will also report on our results on validity and acceptability among patients and parents at the conference.

## Poster 16: Alleviating pre-operative anxiety through patient education with innovative 3D immersive virtual reality - Work in Progress

**Fahad Alam**, Sunnybrook Health Sciences Centre

The prevalence of pre-operative anxiety is estimated as being as high as 80% in surgical populations. Perioperative clinical trials have revealed that pre-operative anxiety is associated with reduced short-term postoperative recovery, poor functional outcomes, increased pain scores, wound infections, increased length of stay and even mortality. The greatest anxiety has been linked with the fear of the unknown, specifically the process of physically being taken to the operating room. Strategies such as implementation of the pre-anesthetic clinic(PAC), the use of videos of what to expect leading up to surgery, calming music, and pharmacological treatments have been costly or with mixed effects. Virtual reality(VR) technology presents a new educational opportunity for patients in an effort to reduce pre-operative anxiety. Through immersive 3D simulation, patients can 'experience' the journey of being prepped for surgery and transferred to the OR. A patient can learn about their pre-operative experience in an engaging/active manner by having the perception of being physically present in the pre-operative experience days or weeks prior to their procedure date. Thus, we have constructed and are beginning to evaluate an immersive 3D simulation to educate patients about the pre-operative experience. We have just initiated recruitment and hope to investigate whether A) immersive 3D VR video can reduce pre-operative anxiety, and B) how this approach compares to current practice of viewing traditional educational videos. One hundred patients will be recruited for this study during their visit to the PAC and equally randomized to two groups: 1) watching a traditional video on a television screen OR 2) viewing an immersive 3D VR simulation using Samsung Gear 360™. Anxiety levels will be assessed during their PAC appointment and the day of surgery using the validated Visual Analog Anxiety Scal (VAS). For the immersive 3D simulation group, the change in VAS scores pre and post 3D video use will be assessed using a paired t-test, or a Wilcoxon signed rank test for the case of non-normally distributed data. To assess how this approach compares to current practice of viewing traditional educational videos we will compare the VAS scores between the two groups. The mean VAS scores will be compared between the two groups using a two sample two sided t-test, or Wilcoxon rank sum test should the data be found to be non-normally distributed. Secondary measures such heart rate and mean arterial blood pressure will also be analyzed at the same time points as the VAS.

## Poster 17: Development and implementation of a novel app for improving anesthesia operating room equipment supply

**Michael Tan**
The Hospital for Sick Children

Background:
Anesthesiologists are dependent on the immediate availability of specialized drugs and equipment. The non-availability of these items may erode efficiency, and lead to unsafe delivery of patient care. At our institution, missing items in the anesthesia cart were documented on paper for later review but suffered from poor utilization. We developed a low-cost mobile app for real-time tracking of equipment shortages, and to guide management of ongoing supply issues.

**Methods:**
Following institutional approval from the Quality Initiative Review Board, data from the last two months of paper documentation and the first two months from a database created via the app was extracted. Comparative statistics was used to examine the effectiveness of the app to the paper method of reporting. The primary outcome was the number and location of reports made. Secondary outcomes include the impact of missing items on operating room efficiency and patient safety, and the most commonly reported missing items.

**Results:**
Missing item reports increased 329% following introduction of the app. 28 reports of missing items were made during the last two months of paper reporting and 120 reports were made in the first two months of the app. The locations reporting increased from 9/24 to 22/24. Wisconsin Size 1 laryngoscope blades were most commonly reported as missing and the most common times for shortages was early morning. The dental and 'emergency OR' reported the most shortages. Anesthesiologists perceived shortages to have high impact on efficiency and safety 27% and 15% of the time respectively.

**Conclusions:**
Our mobile app has resulted in increased reporting of missing anesthesia supplies while providing robust data that has changed our staffing model and equipment supply chain. We are also collating more recent data to create a time series demonstrating changes in the way the app is used over time.

## Poster 18: A student-led, resident-only eLearning platform - a new and acceptable concept for anesthesia residency

**Tariq Esmail**, Sunnybrook Health Sciences Centre

**Background:**
Peer-assisted learning (PAL) is defined as 'People of similar social groupings who are not professional teachers helping each other to learn and learning themselves by teaching'. This definition clearly depicts PAL as an experience that both the tutor and tutee can learn from. Anesthesia training is often described as lonesome due to the limited interaction between residents both within the same year class and across years. This limits the sense of community and learning, as well as the sharing of knowledge across sites, years and experiences. The benefits of PAL are not surprising. The residents share a similar knowledge base and learning experience; the dynamic interplay between these and other factors facilitates fluid communication between in the group whilst also providing an environment for learning and peer-teaching.

**Objectives:**
The goals of our study were to evaluate the acceptability of an anesthesia resident-led online peer-teaching platform. We distributed a survey tool to all anesthesia residents at the University of Toronto to gather information for a.) current use of social media b.) current use of online resources for teaching and c.) acceptance and willingness to participate in an online resident-led platform.

**Results:**
49% of respondents completed the survey. Residents from PGY1-5 were represented among respondents. The majority (80%) used Facebook as a social media platform with less than 20% on twitter and more than 80% not posting on social media (even if they have it). 85% of respondents use online resources to find out drug information, read point of care guides (80%) and to access call schedules and dropbox (78%). 70% of residents have not used a peer-led online resources. However, 72% would consider using an online peer-led online event. 95% perceived benefits of such a system with the most common reasons cited for use being 'save time by accessing previously shared info peers' – 60% and access information the REALLY need for rotations' - 60%. 60% of respondents felt the platform would improve their learning experience of anesthesia and motivate them to study (55%).

**Conclusions:**
Participation in peer-led teaching can be a valuable part of postgraduate anesthesia medical education and was highly rated by residents. The peer-led environment may offer a favorable learning experience among anesthesia residents. Interestingly the use of social media by trainees was ranked very low in keeping with other studies in medical education. Our next steps are to develop a resident-led platform and perform studies on its influence on residency training and competence development.

## Poster 19: Wrist-worn Activity Trackers to Evaluate a New “Early Ambulation Following Cesarean Delivery" Policy: QI/ Patient safety Audit

**David MacLean**
St. Michael's Hospital

**Background:**
Early ambulation is a modifiable factor associated with improving perioperative outcomes including enhancing pain relief, prevention of deep vein thrombosis, reducing hospital stay, and expediting recovery and return to normal activity.1 Additional benefits specific to the cesarean delivery (Cx) population include facilitating breastfeeding and newborn care.2

An early ambulation post-Cx policy has recently been introduced at St. Michael’s Hospital. The policy calls for removing the Foley catheter 6-8 hours post-Cx, and encouraging patients to ambulate as early as possible. To evaluate implementation, we conducted an audit to assess ambulation during the first 24 hours post-Cx in comparison to normal vaginal delivery (NVD) patients. We hypothesized that the new policy should eliminate ambulation differences between NVD and Cx patients during the first 24 hours post-delivery if pain control is adequate.

**Methods:**
Mothers having their first or second delivery by either elective Cx under spinal anesthesia or NVD under epidural analgesia were compared. All patients received standard multimodal analgesia. Patients having any significant comorbidities or postpartum complications were excluded. Validated in surgical populations,3 activity trackers (Jawbone®, San Francisco, California) were fitted around patients’ wrists postpartum and collected 24 hours later to quantify ambulation. A patient-diary captured dynamic pain scores at 2,6,12,18,24 hours, cumulative 24-hour analgesic consumption, and quality of recovery (QoR) scores at 12 and 24 hours.

**Results:**
Apart from age, the sixty patients enrolled in this audit (30/group) were similar. NVD patients walked an average of 442 steps more (56%, $P<0.0001$) than Cx patients during the first 24 hours post-delivery. Two-thirds of this difference (299 steps) was attributed to the 12-24 hours period. There were no differences between groups in pain scores at any time, or in 24-hour cumulative analgesic consumption. (Table) The NVD group had superior QoR scores, with statistically significant and clinically important differences at 12 and 24 hours.

**Discussion:**
This audit underscores the feasibility of using activity trackers in the postpartum population. Despite the new policy, and though both groups had similar pain relief, Cx was associated with reduced ambulation compared to NVD. Incomplete adherence to the ambulation policy is the immediate conclusion. However, QoR should correlate closely with pain control;4 thus QoR differences observed may underscore shortcomings of using pain scores and opioid consumption as the definitive analgesic measures in this population. Analgesic-avoidance and under-reporting postpartum pain5 question the accuracy of conventional analgesic measures, and suggest the need for a broader look at postpartum care outcomes.

## Poster 20: Improving the Quality and Impact of M and M Rounds

**Michelle Chochinov**
Sunnybrook Health Sciences Centre

As part of an ongoing quality improvement strategy within our anesthesia department we have implemented a change in the format of our M and M rounds. We structured it based on the Ottawa M and M Model (Calder et al 2014).

Specific recommendations are given to M and M presenters:

1. Outline educational goals of the discussion
2. Define the problem
3. Examine the data. Analyze the sequence of events in the case
4. Identify possible causal factors
5. Identify the root cause. Any local or systemic factors, possibly involving other departments
6. Suggest corrective actions. Delegate responsibility to specific individuals. Delegation may be done during rounds
7. Plan for verifying the effectiveness of corrective actions. Plan may be formulated during rounds
8. Conclusion and take home points

We also implemented an evaluation tool to be submitted by anesthesia staff addressing the following factors:

1. Case relevance
2. Cause identification (situational vs. systemic)
3. Analysis of causal factors
4. Supporting literature
5. Action plan

So far we have received seventy seven responses for rounds given between 2015 and 2016. These show strong satisfaction with factors one through three (respectively, 84, 81 and 78% strongly agree). Factors four and five were given lower scores (only 60% strongly agrees with these two factors) and have been identified as areas requiring improvement. Specific needs identified include: making M and M rounds interdisciplinary (by inviting other medical services, nursing) and following up on systemic factors.

**Conclusion:**
The enhanced M and M model that the department of anesthesiology at Sunnybrook HSC has adopted has shown to be effective based on the evaluations and the comments received. We have learned that we have to invest more efforts into articulating a plan to mitigate the problem being evaluated.

## Poster 21: Tranexamic acid dosing for cardiac surgical patients with chronic renal dysfunction: Taking 2nd look to optimize patient safety

**Angela Jerath**
UHN-Toronto General Hospital

**Introduction:**
Tranexamic acid (TA) is a common anti-fibrinolytic agent used to reduce blood loss during cardiopulmonary bypass surgery. This drug is renally excreted and likely to accumulate in patients with chronic renal dysfunction (CRD). Our current dosing regimes potentially lead to high and toxic plasma TA concentration levels in this patient group who form up to 50% of the cardiac surgical population. Pharmacokinetic modelling and optimal TA dosing for CRD patients is unknown. With recent data suggesting TA may promote postoperative seizures, optimizing TA dosing is an important patient safety and healthcare cost issue. This aims of this study was to measure plasma TA concentration levels to aid pharmacokinetic modelling and optimal TA dosing for patients with CRD undergoing cardiac surgery.

**Methods:**
Prospective cohort single center study. With REB approval, 49 cardiac surgical patients with stages 1-5 CRD (classified by the Kidney Disease Outcome Quality Initiative) were enrolled. Patients were divided into 2 dosing regimes. Patient with 'Low bleeding risk' undergoing aorto-coronary bypass or single valve repair/replacement received 50 mg/kg bolus. Patients with 'high bleeding risk' undergoing, aortic, redo, multiple valve or combination procedures received the BART dosing regime (loading dose 30 mg/kg, infusion 16/mg/kg with 2 mg/kg in pump prime). Serial plasma TA levels were measured peri-CPB to conduct pharmacokinetic modelling. Plasma TA levels were compared to a therapeutic 100mg/L threshold to assist dose adjustment. Clinical data including postoperative seizures, ischemic-thrombotic complications, in-hospital mortality was collected.

**Results:**
Plasma TA levels were raised in proportion to the severity of CRD. Plasma levels were extremely high among patients with stages 3-5 CRD who received TA bolus and infusion. in the high bleeding risk group. Postoperative seizures and mortality occurred in 8% and 10% patients predominantly in the high bleeding risk group with l advanced CRD. There was no difference in postoperative ischemic-thrombotic complications. A dosing reduction strategy has been recommended for CRD patients.

**Conclusion:**
Current TA dosing regimes leads to high and dangerous plasma TA levels among CRD patients, which may render patients susceptible to seizure activity and additional drug cost. The proposed TA dosing reduction strategy provides a safer regime that can be simply adopted for CRD patients.

## Poster 22: Attendance at an Interprofessional Pediatric Chronic Pain Clinic Reduces Healthcare Utilization: A Retrospective Analysis

**Fiona Campbell**, The Hospital for Sick Children

**Background:**
Chronic pain in children is common and leads to high healthcare utilization. Children with chronic pain are often seen by multiple physicians and specialists, require many diagnostic tests, and have frequent emergency room visits, resulting in high healthcare expenditures. The aim was to evaluate the impact of attendance at an Ontario tertiary referral pediatric interprofessional chronic pain clinic on healthcare utilization as measured by changes to claims submitted by physicians to Ontario Health Insurance Plan (OHIP).

**Methods:**
A retrospective analysis was conducted to review OHIP billings over eight fiscal years for 100 new patients seen at an Ontario tertiary referral pediatric interprofessional chronic pain clinic. OHIP billings were reviewed to extract healthcare utilization data relative to chronic pain metrics. This data included: number of emergency room admittances, physician consultations and follow-up appointments, and overall physician services. This data reflected two years prior to first chronic pain clinic appointment, year of initial appointment, and five subsequent years.

**Results:**
Examination of chronic pain related OHIP billings metrics indicated that healthcare utilization increased during the two years prior to first chronic pain clinic appointment (2009). Following initial appointment and ongoing care at the chronic pain clinic, there was a reduction in healthcare utilization, which was sustained over the subsequent five years.

**Interpretation:**
Attendance at an Interprofessional Pediatric Chronic Pain Clinic reduced healthcare utilization related to the treatment, management, and care of patients with chronic pain, as indicated by a sustained reduction of physician OHIP billings for five years.

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