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<td>Education and Simulation in Anesthesia</td>
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<td><strong>Co-chairs:</strong></td>
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<td>Dr Jordan Tarshis, Department of Anesthesia, University of Toronto, Toronto, ON</td>
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<td>Dr Kristina Khanduja, Department of Anesthesia, University of Toronto, Toronto, ON</td>
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1629377 - THE MANAGING EMERGENCIES IN PEDIATRIC ANESTHESIA (MEPA) GLOBAL RATING SCALE IS A RELIABLE TOOL FOR ASSESSMENT IN PEDIATRIC ANESTHESIA CRISIS MANAGEMENT: A PILOT STUDY
Presenter: Tobias Everett, Department of Anesthesia, The Hospital for Sick Children, University of Toronto, Toronto, ON
Co-authors: Elaine Ng, Daniel Power, Christopher Marsh, Stephen Tolchard, Anna Shadrina, Dylan Bould

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Presenter: Viren Naik, University of Ottawa, Ottawa, ON
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Presenter: Timothy Turkstra, Western University, London, ON
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Co-authors: Nicole Riem, Mark Levine, Walter T Tavares, Dylan Bould

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Presenter: Sylvain Boet, Anesthesiology, The Ottawa Hospital, University of Ottawa, Ottawa, ON
Co-authors: Tobias Everett, Mark Gale, Anita Lai, Alexis Haligua, Dylan Bould
THE MANAGING EMERGENCIES IN PEDIATRIC ANESTHESIA (MEPA) GLOBAL RATING SCALE IS A RELIABLE TOOL FOR ASSESSMENT IN PEDIATRIC ANESTHESIA CRISIS MANAGEMENT: A PILOT STUDY

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Introduction: The use of simulation-based assessments for high stakes physician examinations remains controversial. The Managing Emergencies in Paediatric Anaesthesia (MEPA) course uses simulation to teach evidence-based management of anesthesia crises to trainee anesthesiologists in the UK and Canada. These scenarios have high content validity and form the basis of an on-going international multicentre construct validation study. In this pilot we investigated i.) the feasibility and reliability of custom-designed scenario-specific performance checklists (CL) and ii.) the utility and reliability of a global rating scale (GRS) indicating readiness for independent practice. Our primary goal was to investigate the reliability of the GRS which will allow comparison of different scenarios.

Methods: With local research ethics board approval, subjects were videoed managing simulated operating room emergencies in a single Canadian teaching hospital. The scenarios are both evidence-based and peer-reviewed. Rater training was conducted simultaneously in Canada and the UK using voice over internet protocol (VoIP) video conferencing. All 60 scenarios were rated by all raters (two in the UK, two in Canada). Checklists varied in total score achievable according to the number of observable action points for a given scenario. They are designed to inform the use of the GRS which is applicable across all scenarios. Inter-rater reliability was assessed by calculating the single measures and average measures intraclass correlation coefficients (ICCs).

Results: Description of agreement of ICCs (per Landis and Koch) ranged from fair (on one scenario) to near perfect (on a number of scenarios)(p ≤ 0.001). The reliability of the CL and the GRS was similar. Single measures ICCs showed significantly more variability than average measures ICC suggesting that further rater training would be needed if videos in the main study were to be rated by only one rater.

Discussion: We have established the utility and reliability of a global rating scale which we take forward into our international multicentre study looking to validate assessment tools in pediatric anesthesia. The findings with respect to our performance checklists have allowed refinement of the tools and the rater training program. Our tools will enable us to define the content specificity of our scenarios. The global rating scale allows raters to make a judgement regarding a participant's readiness for independent practice. Simultaneous international rater training using a VoIP is feasible and effective. The country of origin of subject and rater does not influence rating – we therefore pursue our plans to have videos rated in a different country to their origin to assist in confidentiality and blinding as well as augmenting sample sizes by recruiting at multiple sites.

References: 1. Anesthesiology 2010; 112: 1041-52
2. Biometrics 1977; 33: 363-374(No Image Selected)(No Table Selected)
Introduction: Performance of transesophageal echocardiography (TEE) requires two competencies: the psychomotor ability to obtain images and the cognitive ability to interpret these images in correlation with clinical findings. This study focused on psychomotor competencies to acquire images. Commercially available high-fidelity TEE simulators provide a visual and haptic interface to facilitate psychomotor training of novice echocardiographers. The purpose of this study was to determine the effectiveness of a simulation-based curriculum that uses a TEE simulator to train the psychomotor skills to novice echocardiographers, and to compare instructor guided and self directed online delivery of the curriculum.

Methods: After IRB approval, subjects inexperienced in TEE completed an online review of TEE material prior to a baseline pre-test of TEE psychomotor skills using the simulator. Subjects were randomized to two groups. The first (n=17) received an instructor-guided lesson of TEE psychomotor skills demonstrating and practicing with the simulator as an adjunct. The second group (n=16) received a self directed slide presentation of TEE psychomotor skills while practicing with the simulator as an adjunct. Both lessons delivered identical information over 120 min. Following their respective training sessions, all subjects performed a post-test of their TEE psychomotor skills using the simulator. Two assessors blinded to phase of test, rated videotaped TEE performances using a validated scoring system for acquisition of images.

Results: Pre-test TEE simulator scores were similar between the two instruction groups (9.0 vs. 5.0; p=NS). Both groups significantly improved following training, regardless of method of instruction (p<0.0001). The improvement in the change of scores (posttest scores minus pre-test scores) were not significantly different between instruction groups. (12.5 vs. 14.5; p=0.552). The interrater reliability between assessors was 0.964.

Discussion: High-fidelity TEE simulators are an effective training adjunct for the acquisition of basic TEE psychomotor skills. There was no difference in improvement between the different deliveries of instruction. Further research will examine the need for a faculty resource for a curriculum that uses a simulator as an adjunct.
SURVEY OF ANESTHESIA RESIDENTS AS TEACHERS TRAINING ACTIVITIES

Zoe Unger, Megan Hayter

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Introduction: Estimates suggest that residents spend 25% of their clinical time teaching and are responsible for 70% of all clinical teaching that medical students receive during their clerkship rotations (1, 2). Despite these significant teaching responsibilities and the facts that resident teacher training improves residents' teaching, knowledge acquisition, and retention of the materials they teach, the rate of resident as teacher training programs in Canadian and U.S. anesthesia residency programs has not been evaluated (3, 4). This survey study determines the current prevalence of teacher training activities, the formats in which teaching occurs, and program directors' views on the role of residents as teachers.

Methods: Institutional research ethics board approval was obtained for this survey. The survey was created using Survey Monkey (www.surveymonkey.com), and a link to the survey was emailed to anesthesia program directors at all 16 accredited universities in Canada and at 131 association of anesthesiology core programs (AACPD). Follow-up emails were sent using a modified Dillman approach (5). The survey collected demographic information about residency programs, program directors, existing resident teacher training activities, and perceived barriers to instituting teacher training programs. Chi-square and Fisher exact tests were used for categorical and multivariate data analysis using SPSS software, version 19.0 (IBM Corp., Armonk, NY).

Results: The response rate was 46.2% (68 of 147). The majority of program directors indicated that residents are responsible for teaching medical students (85.5%, 58 of 68) and/or other residents (64.7%, 44 of 68). Forty-seven percent of programs (29 of 68) provide residents with regular feedback on their teaching; 58.8% (40 of 68) provide formal teaching instruction/training for residents. Time constraints imposed by clinical and research duties was the most common reason (100% (28 of 28)) reported for not offering resident teacher training programs. A strong correlation existed between program directors who believe “teaching is an important resident role” and those who “believe the teaching skills of residents can be improved” (P = .264*). A strong correlation also existed between the number of years a program director has served as director and the presence of a resident teacher training program (P = .255*)

*Correlation is significant at the 0.05 level (2-tailed)

Discussion: While resident teacher training programs are present in the majority of residency training programs, this study finds that teacher training is not a universal part of residency curricula. Given both that residents educate other residents and medical students and that CanMEDS and ACGME curriculums identify the importance of teaching within their stated competencies, dedicated time should be given to planning and implementing strong resident teacher training programs.

2. CMAJ 1999; 16; 161: 1239-1241
5. Fam Pract. 2009; 26:65-68
Introduction: Technology-enhanced simulation has long been integrated in anesthesiology residency programs. Previous reviews of the anesthesiology simulation literature have had a narrative focus, and the field lacks an up-to-date systematic review and meta-analysis. A rigorous review of simulation-based medical education (SBME) would (i) allow course directors to make informed decisions about the role of SBME in anesthesiology training and (ii) provide researchers information to help identify fruitful questions.

Methods: We searched MEDLINE, EMBASE, CINAHL, PsychINFO, ERIC, Web of Science, and SCOPUS from inception to May, 2011. Working independently and in duplicate, we selected articles that used SBME for anesthesiology training with health professions learners. We abstracted information on instructional design, outcomes, and study quality. We used random-effects meta-analysis to analyze pooled results from individual studies. Ethics approval was not required for this review.

Results: From 10,903 candidate articles, we included 81 studies enrolling 6341 participants. When compared to no intervention (55 studies; 69 outcome measures), SBME was associated with significant effect sizes that were moderate for behaviours (0.60, p=.02) and large for skills, knowledge, and time (0.81–1.04, ps<.001). For direct effects on patients, pooling of 2 studies found no significant effect size (-0.39, p=.08). When compared to non-simulation instruction (11 studies; 19 outcome measures), SBME was associated with significant effect sizes that were moderate for satisfaction (0.39, p=.02) and skill (0.42, p=.04), and large for behaviour (1.77, p<.001); effect sizes were non-significant for time, knowledge, and patient effects (-0.18–0.23, ps>.26). When comparing two SBME interventions, low-technology simulators (4 studies; 8 outcome measures) were associated with significantly lower satisfaction outcomes (-0.47, p<.001), yet the effect size for time, process, and patient outcomes (-0.06–0, ps>.87) suggest similar effectiveness relative to high-technology alternatives. Regarding instructional design, placing trainees in clinically-relevant simulation (4 studies; 5 outcome measures) scenarios was associated with significant effect sizes that were small for knowledge (0.15, p=.02), large for satisfaction (0.97, p=.008), and non-significant for skills (0.14, p=.54). By contrast, training that emphasized debriefing (3 studies; 4 outcome measures) with multiple information sources was associated with negligible effect sizes for time (0.09, p=.63) and skill outcomes (-0.07, p=.54) when compared to single source debriefing.

Discussion: SBME for anesthesiology is associated with significantly improved outcomes compared to no intervention and appears equivalent to non-simulation instruction; however, both analyses showed little benefit for measures of patient outcomes (perhaps due to small sample of studies). When comparing low-technology and high-technology simulators, learners prefer the latter yet learning outcomes suggest little difference between the two - a finding with direct cost implications. For educators, it seems that designing clinically-relevant scenarios will enhance some, not all, SBME outcomes. For researchers, the results suggest a need to re-frame study of the debriefing process in anesthesiology SBME.
Introduction: The role of high fidelity simulation for anesthesia education is now well established. In 2005, a survey of a tertiary care centre identified several perceived barriers to simulation-based education (SBE). Staff anesthesiologists perceived SBE significantly less useful than trainees. With growing interest in simulation for assessment and continuing professional development (CPD) it is essential to determine current perceptions regarding this modality. This survey was administered to compare current staff anesthesiologists’ perceptions of SBE for CPD with those from the previous 2005 survey.

Methods: Following REB approval, a survey of similar structure and core content to the 2005 survey was distributed to 570 anesthesiologists (staff, fellows and residents) affiliated with university teaching hospitals both in electronic and paper-based format. The survey collected data on respondents’ experiences and perceptions regarding simulation. Responses categorized by training level were derived and compared to the 2005 survey.

Results: A total of 149 responses were collected. Demographics by level of training are representative of the current anesthesia population. 78.7% of staff anesthesiologists have experienced simulation session compared to 58% in 2005 and a greater proportion of them would attend a simulation session if offered (74.7% vs. 68%). In 2012, a greater proportion of staff felt that simulation training was relevant to their learning compared to 2005 (78.2% vs. 65%). Despite a greater proportion of staff who felt simulation should be recommended for continuing medical education credits (69% vs. 58%), there was no change in the perception regarding its educational value (81.0% vs. 83.3%). Perceived barriers such as lack of free time and financial consequences remain the same in 2012. However, in 2012 a greater proportion of staff perceived judgment by others as a barrier compared to 2005 (37% vs. 25%)

Discussion: There is more experience with and more positive perceptions of simulation for CPD since 2005. However, despite changing attitudes towards the usefulness of simulation, barriers such as lack of free time, judgment by peers and financial consequences remain important factors limiting the use of simulation for staff anesthesiologists. These barriers need to be addressed in order to increase the use of SBE in staff anesthesiologists.

PRE-PROCEDURAL ULTRASOUND DOES NOT DECREASE THE NUMBER OF ATTEMPTS IN TRAINEES PERFORMING INTRATHECAL ANESTHETIC FOR OBSTETRIC PATIENTS: A RCT

Timothy Turkstra¹, Kristine Marmai¹, Indu Singh¹, Kevin Armstrong¹, Kamal Kumar¹

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Introduction: Real-time ultrasound guidance for regional anesthesia is widely established. Concerns for the potential neurotoxicity of ultrasound gel has caused many anesthesiologists to limit ultrasound guidance for neuraxial anesthesia to pre-procedure examination. This has been shown to be effective to increase trainee success in placing epidural anesthesia in parturients. This study was designed to evaluate pre-procedure ultrasound examination for patients utilizing spinal anesthesia for Caesarean Section, amongst trainee anesthesiologists.

Methods: This trial was registered at clinicaltrials.gov after obtaining local research ethics board approval. Eighty obstetric patients with normal anatomy who required Caesarean Section were randomly allocated to pre-procedure ultrasound examination and palpation or palpation alone, prior to intrathecal anesthetic placed by anesthesia trainees. The primary outcome was the number of attempts, recorded by a blinded observer, who also recorded secondary outcomes of: placement duration, block location, block height, and the incidence of: need for staff intervention, paresthesia, and bloody tap. Subjective ease of placement was rated by the trainee on a 100 mm visual analog scale.

Results: Baseline demographic data was similar between the two patient groups. The median number of attempts with pre-procedure ultrasound prior to palpation was 3 [interquartile range 2-7]. This was not significantly different from the number of attempts with palpation alone of 3 [1-6], (p = 0.69). The median duration of spinal placement with ultrasound was 92 [51 140] seconds vs. 75 [53-126] seconds with palpation alone (p = 0.56). There was no statistical difference between placement duration, need for staff intervention, paresthesia, bloody tap, block location, block height, or subjective ease of spinal placement.

Discussion: In this study of anesthesia trainees placing spinal anesthesia with pre-procedure ultrasound, no significant difference was observed in the number of attempts, duration of spinal placement, presence of blood, block height, or subjective ease of spinal placement.

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Introduction: The role of simulation has grown exponentially in recent literature as it provides an efficient method to teach complicated technical skills in a controlled environment. This rapid expansion is evident in its application to transesophageal echocardiography (TEE), where proficiency has traditionally been gained by repeated bedside examinations. While kinematic metrics data of probe motion can show the utility of simulation by improvement of movement efficiency, this technology may also be used to assess accuracy of the images acquired as an endpoint. In this study, the accuracy of the final image of a series of standardized TEE views was assessed in both residents and cardiac anesthesiologists.

Methods: After IRB approval, a cohort of 17 anesthesia residents were enrolled in an 8-session TEE course over 4 weeks, with each session involving a didactic component followed by hands-on teaching on the CAE Vimedix (CAE Healthcare, Montreal, Canada) simulator system for TEE. Kinematic metrics data were acquired at the end of the 1st and 4th weeks for 7 standardized TEE views. Data were also acquired from 4 board-certified cardiac anesthesiologists for these views. The x, y, z coordinates of the probe as well as its TEE multiplane angle from both groups were compared to the agreed-upon planes for these views and analyzed for accuracy.

Results: When coordinate and TEE multiplane angle data were compared between weeks 1 and 4 for the residents, there was a significant improvement in accuracy for displacement (p=0.004) but not for TEE multiplane angle (p=0.69). However, when week 4 for the residents was compared to the experts, the experts were significantly more accurate for displacement (p=0.005) as well as multiplane TEE angle (p=0.03).

Discussion: It is feasible to measure TEE position accuracy as an endpoint in the learning of TEE by simulation. It may be used as a marker to measure the level of acquired proficiency, as this study showed improvements in accuracy over the course of 4 weeks in residents. However, despite this improvement, they were still shown to be significantly less accurate when compared to experts. In this era of competency-based medical education, the ability to quantify proficiency as a marker of progress of learning becomes very important. TEE metrics accuracy provides an objective measurement to quantify the level and learning in a TEE curriculum.

Introduction: Workplace-based assessment (WBA) is defined as the evaluation of demonstrated professional practice in a real work setting by an assessor, and it is considered a cornerstone of the theory of competency-based education [1]. WBA tools include: portfolios, case-based discussions, the mini-clinical evaluation exercise (mini-CEX) and the direct observation of procedural skills (DOPS).

This study aimed to evaluate the use of WBA tools in all Canadian anaesthesiology resident programs and to identify the current state of faculty development with respect to these tools.

Methods: After Research Ethics Board approval, residency program coordinators for all 17 University Departments of Anaesthesia in Canada were invited to complete an online survey.

Results: The response rate was high with 68% (44 of 64) of Resident Program Coordinators participating, representing 88% of the University Departments of Anaesthesia. The most widely used tools were locally designed assessment tools (25/64), direct observation of procedural skills (DOPS) (28/64), multisource feedback (20/64), and case-based discussions (24/64). Both oral and written feedback is indicated in 88.6% of responses with immediate feedback occurring in 61.8%. In most cases (65.5%), the Resident Coordinator gives delayed feedback and in 31.8% of cases direct feedback was given daily by the supervisor. The large majority of assessors (88.7%) did not receive training before the use of WBA tools.

Discussion: WBA tools are widely implemented in Canadian postgraduate Anaesthesia Programs, but the tools vary among teaching hospitals. Locally designed WBA tools are predominantly used raising the question of whether validity has been established. Faculty development appears to be underdeveloped and improvement may increase the educational benefit of WBA.

References: 1. Medical Teacher 2007 29: 855-71
Introduction: Non-technical skills such as task management, team work, situational awareness, and decision-making are crucial for the management of crises to ensure patient safety. Simulation training has been demonstrated to be effective in learning the non-technical skills of crisis resource management (CRM) and to be more effective than didactic teaching.[1, 2] In addition to increasing knowledge and skills, learning CRM in the simulator transfers to patient care.[2] Simulation training is becoming increasingly popular as a teaching modality; however, many programs have limited resources to engage their trainees in simulation curricula. As a result, simulation instructors often designate a practicing (active) participant who is given the opportunity to practice their clinical skills in a simulated scenario while other trainees are assigned to an observational role outside the simulation room. It has yet to be determined how the practicing/observer role of the trainees impacts their learning during simulation teaching. Currently, we are unaware if observer participants improve their skills at the same rate as their practicing colleagues or what is the optimal ratio of active to observing learners. This study aims to compare the effectiveness in learning CRM principles when being a practicing (active) participant in simulation-based education versus being an observer participant. We hypothesize that practicing participants will improve their CRM skills more than observer participants.

Methods: This will be a prospective randomized controlled study. After Institutional Research Ethics Board approval, participants will be randomized to one of two groups with stratification according to their level of training: the active group and the observer group. Each participant of the active group will be paired with one of the participants from the observer group. The active participant will individually manage a simulated crisis scenario (pretest) while the paired observer participant will observe the scenario from outside the simulation room using a video transmission system. Immediately after, both participants will be debriefed by a trained instructor focused on CRM principles. The same active and observer participants will then individually manage another simulated crisis scenario (post-test). Two independent raters, blinded to the study design and to the randomization groups, will review the videos of all scenarios in a random order and rate each participant on their CRM performance using a global rating scale (GRS).

Results: The primary hypothesis of practicing participants will improve their CRM skills more than observer participants will be tested with a between-groups comparison of the GRS scores of the post-test only using a Mann-Whitney test. Data analysis is under way and, if this abstract is selected, final results will be presented at the 2013 Canadian Anesthesiologists’ Society meeting.

Discussion: This study targets the major issue of resource allocation in simulation education. Costly simulation training and ever expanding residency programs are decreasing the opportunities afforded to residents to be the practicing (active) participant in simulation. The results of this study will help determine the optimal method of engaging learners in simulation.