



# **2020 CAS Annual Meeting**

## **Education and Simulation in Anesthesia**

### **(Abstracts)**

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## Assessing the Validity of Entrustment Scales Within a Program of Assessment for Anesthesiology

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**Introduction:** Competency-based medical education requires robust assessment in authentic clinical environments. Entrustment scales have emerged as a means of describing trainees' ability to perform competently using work-based assessment (WBA). However, psychometric properties of entrustment-based assessment are relatively unknown, particularly in anesthesiology. This study assessed the generalizability and extrapolation evidence for entrustment scales within a program of assessment during anesthesiology training.

**Methods:** Ethics approval was obtained from the local REB. Entrustment scores were collected during the first seven blocks of training for three resident cohorts. Entrustment scores were assessed during daily evaluations using a clinical case assessment tool (CCAT) within the preoperative, intraoperative, and postoperative setting. Internal consistency was calculated using Cronbach's alpha. Spearman's correlations measured the relationship between median entrustment scores and percentiles scores on the Anesthesia Knowledge Test (AKT)-1 and AKT-6, mean Objective Structured Clinical Examination (OSCE) scores, and rankings of performance by the Clinical Competence Committee (CCC).

**Results:** Analyses were derived from 2,309 CCATs from 35 residents. Internal consistency was highest for intraoperative scores ( $\alpha=0.78$ ), followed by postoperative ( $\alpha=0.60$ ) and preoperative ( $\alpha=0.59$ ) scores. Preoperative and postoperative scores correlated with median CCC rankings (preoperative:  $\rho=0.48$ ,  $p_{\text{bonferroni}}=0.024$ ; postoperative:  $\rho=0.47$ ,  $p_{\text{bonferroni}}=0.03$ ) but not with AKT or OSCE scores (all  $p_{\text{bonferroni}} > 0.12$ ). Intraoperative scores significantly correlated with the AKT-6 ( $\rho=0.51$ ,  $p_{\text{bonferroni}}=0.012$ ), mean OSCE ( $\rho=0.45$ ,  $p_{\text{bonferroni}}=0.036$ ), and CCC performance rankings ( $\rho=0.52$ ,  $p_{\text{bonferroni}}=0.006$ ).

**Conclusion:** Within a program of assessment, the use of entrustment scales in anesthesiology training does provide early evidence of validity. Perioperative entrustment scales had good overall reliability, particularly in the intraoperative setting. Interpretation of entrustment scores in this setting may constitute a valuable adjunct to summative evaluation by the CCC.

## Assessment of CanMEDS Competencies in Work-Based Assessment: Challenges and Lessons Learned

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**Introduction:** Competency-based medical education (CBME) aims to provide an outcomes framework that clearly articulates competencies for practice.<sup>1,2</sup> Competency-focused instruction enhanced by meaningful narrative feedback on practice competencies, elicited through workplace-based assessment (WBA), will play an essential part of CBME-based postgraduate training programs. However, success of WBA will depend on both trainees' and faculty members' ability to recognize the relevance of CanMEDS milestones in daily workplace activities, and ability to assess them through narrative WBA.<sup>2-6</sup> Credible, actionable and timely feedback is an integral component of this process; however, literature has repeatedly shown that feedback challenges abound, particularly for non-medical expert CanMEDS intrinsic roles.<sup>7,8</sup> This study aims to explore the distribution of narrative feedback related to milestones for the intrinsic roles, and challenges associated with their assessment in WBA.

**Methods:** Ethics approval for this study was obtained via the Ottawa Health Science Network Research Ethics Board. Informed consent was also obtained from study participants. In phase I of this study, a total of 3517 WBAs containing 15,834 comments were analyzed. Content analysis was used to code comments by the CanMEDS milestones framework for Anesthesiology. Descriptive statistics were then used to analyze the frequency of narrative comments for each CanMEDS role and milestone. In phase II, ten Anesthesiology residents were recruited via purposeful sampling. Residents participated in semi-structured interviews, which were informed by phase I findings, to explore challenges they experienced with CanMEDS using WBA. Interviews were anonymized and transcribed. Constructivist grounded theory informed data collection and analysis at this stage.

**Results:** Results from phase I demonstrated the following proportion of WBA comments per CanMEDS role: Medical Expert (36%), Communicator (16%), Collaborator (12%), Scholar (12%), Leader (8%), Professional (8%), and Health Advocate (8%). However, comments were limited to a specific subset of milestones within each CanMEDS role. Strikingly, of the total 72 intrinsic role milestones, a significant proportion (n=55, 76.38%) were not adequately addressed through WBA comments. Results from phase II corroborated the aforementioned findings. Furthermore, through interviews, potential reasons were identified for why some milestones may not be addressed in WBA. These included: overlap between milestones, irrelevance of certain milestones to daily practice, need for better mapping of milestones, inappropriate conceptualization or understanding of milestones, and the aspirational nature of milestones.

**Conclusion:** There is evidence to suggest that not all CanMEDS roles and milestones are equally addressed in WBA. Understanding this phenomenon through ongoing data driven program evaluation would allow opportunities for targeted faculty development, revisions to the CanMEDS competency framework in the context of WBA, whilst making the framework more understandable and acceptable for all stakeholders. Future steps may involve structured techniques to further refine the CanMEDS framework in Anesthesiology, and determining whether this phenomenon exists within other specialties.

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## Coaching for Performance Change: The Development and Evaluation of a Longitudinal Academic Coaching Program for Competency-Based Medical Education Residents in Anesthesiology

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**Introduction:** Frequent observation and formative assessment with feedback is essential to a competency-based medical education (CBME) curriculum to promote trainees progressive development towards independent practice – these assessments should provide quantitative and qualitative information to enable residents to identify achievements, recognize gaps, and modify learning plans (1). Longitudinal academic coaching has been identified as one strategy to help faculty support residents and enable them to use feedback and self-reflection for their own learning progression (2). The R2C2 model, developed by Sargeant and colleagues, is an evidence-based guided reflection feedback model consisting of four steps: RELATIONSHIP building, exploring resident REACTIONS to feedback data, discussing feedback CONTENT, and COACHING for performance change (3). This model represents one framework for facilitating a coaching relationship with trainees. The purpose of this quality improvement project was to assess the utilization and initial impressions of an academic coaching program (ACP) one year after initial debut, with the intention to adjust and improve the program as it grows to include additional CBME cohorts.

**Methods:** Ethics approval was waived by the local REB. All participation was anonymous and voluntary. A longitudinal ACP was developed for anesthesiology CBME residents at the University of Toronto. Each resident was paired with a faculty anesthesiologist, and both were provided with information about the R2C2 framework. One year after implementation, we surveyed participants to assess the utilization of the program, perceptions, and progression through the R2C2 framework.

**Results:** Our survey received responses from 16 of 32 (50%) CBME residents and 11 of 22 (50%) faculty coaches. Pairs had met on average two times since implementation. Primary meeting topics included social connection, goals, and mentoring. Within the R2C2 model, most participants reported satisfaction with the RELATIONSHIP between trainee and coach. Many pairs had progressed to exploring REACTIONS and understanding feedback CONTENT. Fewer had reached COACHING for change, setting goals and then following up on progress. Both groups indicated a desire for increased role clarity and specific coaching strategies.

**Conclusion:** The survey of our ACP program highlighted satisfaction with the early stages of the R2C2 coaching framework. Based on survey responses, we have introduced changes for the current year. Near-peer discussions between CBME residents are helping to create a culture of reflection and coaching. Structure has been improved with the creation of a resident worksheet to guide pre-meeting reflection and post-meeting goal setting. Protected time for

residents has helped to enable meetings or meeting preparation. The creation of a resident assessment dashboard allows residents and coaches to have complete access to resident assessment data. A follow-up survey will be repeated in spring 2020 to better understand interval growth in the academic coaching program and further opportunities for improvement.

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## Logging out: A Comparative Analysis of Automated Logs and Resident-Driven Logbooks in Anesthesiology

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**Introduction:** Resident logbooks of clinical case exposures are widespread in medical education despite evidence of poor accuracy and acceptance of logbook data. Electronic records (e.g. Anesthesia Information Management Systems, AIMS) may permit an objective means of auditing longitudinal case exposure. We evaluated the agreement between AIMS and Logbook for tracking case exposure during anesthesiology residency.

**Methods:** Ethics approval was obtained from the local REB. We performed a historical cohort study with anesthesiology residents (2011-2018, all of whom used a logbook contemporaneously with AIMS) at a multi-site academic health sciences network. The primary outcome was total case exposure; secondary outcomes were exposure for 7 surgical specialties. Correlation of case numbers between AIMS and logbook was assessed using Pearson correlation; agreement using Bland-Altman plots and intraclass correlation coefficients (ICC).

**Results:** Twenty-seven anesthesiology residents were included. Case numbers were greater with AIMS relative to logbook ( $649 \pm 103$  vs  $583 \pm 191$ ,  $p=0.049$ ). Total case volumes between systems were moderately correlated ( $r=0.50$ ) with moderate agreement ( $ICC = 0.42$ ). Bland-Altman plots showed variable agreement between AIMS and logbook (bias =  $66 \pm 166$  cases). Within the surgical specialties there was moderate agreement ( $ICC >0.5$ ) for orthopedics, vascular, and neurosurgery and weaker agreement ( $ICC <0.5$ ) for thoracics, urology, general surgery and gynecology.

**Conclusion:** For anesthesiology resident case logging, the number of cases logged in an AIMS was higher, with lower variance, than a logbook. The systems demonstrated moderate correlation and agreement. Given the additional time and resources required for logbooks, AIMS may be a suitable alternative for tracking case exposure where available.

## Performance Assessment and Clinical Experience (PACE) Scorecards: A Post-Implementation Physician Survey

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**Introduction:** Self-documented logs of clinical exposures are commonly employed to audit residents' learning experiences and infer progression towards competency. However, a recent pilot project at our institution identified marked disparity in clinical volume tracked with logbooks compared to an electronic health information system (HIS). The current study sought to characterize anesthesiology resident's perceptions of performance data extracted from a HIS specific to the perioperative setting, the anesthesia information management system (AIMS).

**Methods:** Ethics approval was obtained from the local REB. We collated and summarized annual process and outcomes data from AIMS. Resultant individualized performance scorecards and a previously validated 11-item post-implementation survey were co-distributed to anesthesiology residents at a single institution (n=42).

**Results:** We obtained a response rate of (17/42; 40%). A majority of residents agreed/strongly agreed that scorecards were personally interesting (15/17; 88%), valuable for professional development (13/17; 76%), an effective measure of clinical experience (12/17; 71%), and influential of their future practice (12/17; 71%). A majority of residents also agreed/strongly agreed that scorecards were preferable to logbooks (12/17; 71%). Only 41% (7/17) of respondents agreed/strongly agreed that scorecards were an effective measure of clinical performance. Qualitative responses indicated metrics that residents felt deserved inclusion in subsequent scorecards including anesthesia start-time as well as the number of obstetric epidurals and regional procedures performed.

**Conclusion:** Performance scorecards were overall well-accepted among anesthesiology residents and preferred to manual-entry logbooks. Further research is necessary to discern whether this form of feedback influences practice behaviors and/or is sensitive to clinical progression through residency.

## Simulation and Interactive Classroom in Interdisciplinary Communication Skills Training: Qualitative Analysis Reveals Strengths of Each Modality

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**Introduction/Background:** Team communication errors contribute to poor outcomes in over 50% of sentinel cases in obstetric care. [1] Communication skill training as part of interprofessional development curricula requires careful consideration of instructional design. This study reports ethnographic descriptions of how instruction unfolds through two common teaching modalities with the same learning objectives, (1) simulation with group-debriefing and (2) guided problem-based learning (GPBL) presentation and group work. Simulation is an excellent modality for eliciting behaviours that lead to errors and modeling good communication, but how interactions evolve throughout a simulation may not predictably achieve predetermined objectives. Simulation delivery requires specialized equipment and operators. GPBL can integrate a range of key evidence-based features of good and poor communication into cases, but does not enable practice within the bounded rationality of timely complex decisions and communications in clinical care contexts.

**Objectives:** Deepening the understanding of how simulation and GPBL unfold with reflection on their relative instructional benefits and limitations. Evidence-based learning objectives were developed and implemented with the goal to teach communication skills to an interprofessional group of anesthesiologists, obstetricians, and nurses involved in high risk obstetric care.

**Methods:** Ethics approval was obtained from the local REB. Participants were assigned through stratified randomization to one of two instructional modalities. Each session was video recorded with recordings imported into MAXQDA software for coding. Task-analysis identified whether and how predetermined objectives were met and were coded for frequency of occurrence focusing on “sameness” between simulation and classroom in accordance with the study protocol. Conceptual analysis within an ethnographic framework captured the gestalt of each approach to professional development of communication skills, considering the relational nature of the participants, resources available, and social norms within the contexts.

**Results:** In simulation, the focus on medical management errors dominated the reflective post-simulation group discussion and participation in debriefing followed communication patterns, with dominating voices, established during simulation. Classroom sessions featured a focus group-like, in depth exploration of real-life experiences of participants as they reflected on errors of anonymous “others” and system-issues. Engagement in classroom discussion was balanced across participants.

**Conclusions:** This is the first analysis of these instructional modalities in interdisciplinary settings. Both modalities provided unique and invaluable learning. While experiential learning was provided in simulation sessions, the interactive classroom sessions lead the participants to qualitatively different insights. Classroom discussions generated a greater range and richness of themes. A comprehensive program for interdisciplinary communication education should include both interactive classroom and simulation on parallel learning objectives. Such a program would have the potential to improve patient safety by holistically advancing the skills as well as addressing workplace-specific issues. Authors will share the design of integrated modalities, leaning on the relative strengths of each modality for future instructional design.

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## The Perinatal Emergency Team Response Assessment (PETRA) Scale as a Self-Assessment Tool: A High-Fidelity In-Situ Simulation Study

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**Introduction:** The PETRA scale was developed to assess teamwork in the management of obstetric crises.<sup>1</sup> The scale has previously undergone testing in the simulation setting with expert evaluators and has been shown to be valid and reliable.<sup>2</sup> However its validity and reliability for self-assessment is unknown. The aim of this study was to assess the validity and reliability of the PETRA scale as a self-assessment tool when used in an in-situ simulation environment on a high-risk labor and delivery unit.

**Methods:** Ethics approval was obtained from the local REB. A high-fidelity simulation of an obstetric emergency (uterine rupture) was carried out 21 times, with 6 different participants in each multi-disciplinary team. Each participant rated their team's performance using the modified PETRA scale (7 domains, 28 items) with a 5-point rubric (1=unacceptable to 5=perfect). Recorded simulation videos were sent to external expert raters for review. Self-assessment of team performance by team members was compared with assessments by three expert raters. The primary outcome was the PETRA scale score (overall and each of 7 domains), as assessed by individual participants and expert raters. Reliability of the PETRA scale within teams and among expert raters was analyzed using intra-class correlation (ICC). Mixed effect models were used to determine if expert ratings were statistically different from the self-assessment of teams.

**Results:** 125 healthcare personnel participated in the study (staff, fellows, and residents from anesthesiology and obstetrics, medical students, anesthesia assistants, and labor and delivery nurses). With the exception of one domain (situational awareness), scores on all domains and the total PETRA score were statistically different between self-raters and the expert raters, with self-raters tending to rate higher than the experts. (Total score – mean (Standard Error, SE) 4.00 (0.05) for self-assessments, and 3.78 (0.07) for experts' assessments) ( $p = 0.0001$ ) (Table 1).

Low ICC showed low reliability among self-assessment teams and also among expert raters for all domains and the total score. (Total score - ICC 0.08 (95% CI 0.01 - 0.38) for self-assessors, and 0.09 (95% CI 0.00 – 0.77) for experts).

Conclusion: Our study suggests that self-assessment cannot replace expert assessment for the PETRA scale. Specifically, this study demonstrated higher rating scores with self-assessment versus assessment by external expert observers, consistent with the results of other similar simulation studies.<sup>3</sup>

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Table 1. Comparison of modified PETRA scores between self and expert assessors

Domain	Self-assessment, Least Square Mean (Standard error)	Expert assessment, Least Square Mean (Standard error)	p-value
Shared mental model	4.20 (0.05)	3.87 (0.07)	<0.0001
Communication	3.81 (0.06)	3.65 (0.08)	0.0484
Situation awareness	4.02 (0.06)	3.94 (0.07)	0.3118
Leadership	3.94 (0.08)	3.70 (0.09)	0.0057
Followership	3.99 (0.05)	3.76 (0.07)	0.0042
Workload management	4.06 (0.05)	3.71 (0.07)	<0.0001
Behaviours & Attitudes	4.33 (0.05)	4.02 (0.07)	0.0002
Total	4.00 (0.05)	3.78 (0.07)	0.0011