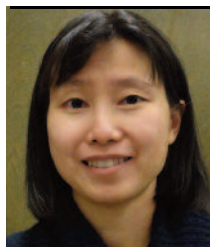


# Implementation of a Comprehensive Procedural Skills Examination for Internal Medicine Using Simulation at the University of Calgary: A Descriptive Report

Irene W. Y. Ma MD MSc, Maria Bacchus MD MSc, Jennifer Glow, Charlene Brass, Liz Fradgley BHSc, Michael Fisher MD MSc, Ghazwan Altabba MD, Jeffrey P. Schaefer MSc MD



## About the Authors

Irene Ma (left), Maria Bacchus, and Jeff Schaefer are general internists at the Foothills Hospital. Michael Fisher is a general internist at Peter Lougheed Centre. Ghazwan Altabba is a general internist at Rockyview General Hospital. Jennifer Glow and Charlene Brass are with the Department of Medicine, University of Calgary. Irene Ma and Liz Fradgley are with the W21C, University of Calgary. All are based in Calgary, Alberta. Correspondence may be directed to [ima@ucalgary.ca](mailto:ima@ucalgary.ca).

Competency in the performance of a number of bedside procedures is an objective of training, set forth by the Royal College of Physicians and Surgeons of Canada.<sup>1</sup> These procedures include venous access including central line placement, lumbar puncture, peripheral arterial catheter insertion, abdominal paracentesis, endotracheal intubation, thoracentesis, and knee arthrocentesis.

The assessment of procedural competence is primarily the responsibility of the Residency Training Program, which is in turn informed by the preceptors who educate and evaluate individual residents during clinical rotations. While this approach has been satisfactory historically, this is no longer the case. Societal expectations around quality and safety of care, resident expectations regarding fairness and due process in assessment procedures, and the profession's commitment to continued improvement compel us to find new ways to ensure that certified specialists in internal medicine have achieved these expected competencies.

## Why Assessments for Competency Have Been Problematic

Assessment of procedural skills has traditionally relied on a logbook-based approach. In this approach, a trainee who had completed the minimum required number of procedures was deemed competent. One major argument against this approach is the lack of validation for a specific recommended number for each procedure. Indeed, what evidence there is suggests that the number needed to attain competency is often much higher than the minimum recommended number based on expert opinion.<sup>2-4</sup> Thus, the number of times a trainee has performed a procedure is

at best only a surrogate marker for competency.

The second traditional approach involves having the supervising physician directly observe trainee performances in the clinical setting. This approach too is fraught with problems. Clinical encounters occur at unpredictable times. Our previous survey suggests that only about half of the central venous catheters insertions were supervised by faculty members.<sup>5</sup> If faculty members cannot reliably be present during procedures, objective assessments are difficult to achieve. Secondly, varied clinical environment precludes standardization of assessments. For instance, how does one rate a trainee who was unsuccessful in placing a central venous catheter in an awake patient with a difficult and complex anatomy, compared with a trainee who successfully performed the procedure in an intubated patient with standard anatomy? Lastly, one may argue that assessments during clinical care may even be potentially harmful. A trainee, aware that his or her performance is being evaluated, may experience performance anxiety, which may negatively impact on patient outcomes. Indeed, attending physicians serving the dual role of both a clinical supervisor and an evaluator may sometimes find themselves in a difficult position.<sup>6</sup> Thus, we argue that a standardized observed examination using simulation should be the preferred method of bedside procedural skills assessment. Indeed, simulation for technical skills assessment is endorsed by the Accreditation Council for Graduate Medical Education.<sup>7</sup>

## Implementation of a Comprehensive Procedural Skills Examination

In 2009, the University of Calgary implemented a simulation-based procedural training curriculum.<sup>8</sup> This academic year

(2011–2012), we launched our first comprehensive simulation procedural skills formative examination. To do so, seven procedural skills were evaluated in five 20-minute objective structured performance-related examination (OSPRE) stations, with standardized instructions. In this report, we outline briefly the steps taken to implement this examination. In addition, we address lessons learned from challenges we faced and propose future directions.

### Examination Set-Up

Prior to the implementation of the examination, a comprehensive checklist for each skill station was created, with content validity and standard setting completed through expert panel input. For this task, we gathered six experts for each procedure. Standardized examination instructions were prepared. Material resources were then gathered for the examination; these included appropriate simulators for each technical skill assessed, procedural kits and supplies, replacement parts and fluid, ultrasound machines, assessment forms, and examination instructional materials. Written examiner instruction packages were prepared and distributed to examiners. Information included instructions given to candidates, expectations of the skills evaluated, the scope of the examination, the role of the examiner, the timing and flow of the examination, assessment forms, a description of the simulators, and how to avoid damaging the simulators. In addition, we prepared optional instructional videos for examiners to view on how to troubleshoot simulators. In order to standardize the examination set-up, we photographed each station, showing how the materials and simulators were set up. Material resources needed for each station were packaged in a standardized kit and with contents displayed on a labelled photograph. These photographs, as well as a material checklist, were referenced for each station for the duration of the study.

### Examination Implementation

Two tracks of procedural skills were evaluated on academic half-days. Twenty minutes were allotted to each skill station except for arterial blood gas sampling, intubation, and knee arthrocentesis. These three skills were combined into one single 20-minute station. Each station had one examiner who had been instructed to fulfill the role of a nursing assistant and to allow candidates to go through each station unchallenged. Two minutes of feedback were given to the candidates by the examiner at the end of each station.

To date, we have run six afternoons of examinations (4 hours each), with 45 residents having completed all seven skills evaluations.

### Table 1. Tips for Running Objective Structured Performance-Related Examinations for Procedural Skills

Use valid and reliable assessment tools.

Photographs, checklists, and equipment kits assist with the standardization and set-up of stations, but significant human resources are still required.

Faculty training is needed on simulator use and evaluations.

Funding is critically important for the pilot implementation phase of the examination.

### Challenges and Barriers

Station set-up and scheduling, faculty development, simulator care, simulator maintenance, and costs are the biggest challenges in the implementation of these examinations. (Tips for running these examinations are presented in Table 1.) While photographs of equipment and stations assist in standardizing our examination and assisting with equipment set-up, these examinations require significant commitment from the program staff and assistants, who are integral to the success and conduct of the examination. In order to cover the costs of acquiring additional simulators and payment for experts to participate in expert panels for the contribution of content validity to the assessment forms, we obtained support from the Department of Medicine Research Development Fund Competition, which made this work possible.

### Future Directions

In our next phase, we will evaluate the reliability of the examination and validate each of our developed assessment tools. If shown to be valid and reliable, the role of these procedural examinations in a summative examination can then be considered and explored.

### References

1. Royal College of Physicians and Surgeons of Canada. Objectives of Training in the Specialty of Internal Medicine. Version 1.0. Ottawa (ON): The College, 2011; [http://rcpsc.medical.org/residency/certification/objectives/intmed\\_e.pdf](http://rcpsc.medical.org/residency/certification/objectives/intmed_e.pdf).
2. Hawes R, Lehman GA, Hast J, et al. Training resident physicians in fiberoptic sigmoidoscopy. How many supervised examinations are required to achieve competence? *Am J Med* 1986;80(3):465–70.
3. Cass OW, Freeman ML, Peine CJ, et al. Objective evaluation of endoscopy skills during training. *Ann Intern Med* 1993;118(1):40–4.
4. Jowell PS, Baillie J, Branch MS, et al. Quantitative assessment of procedural competence: a prospective study of training in endoscopic retrograde cholangiopancreatography. *Ann Intern Med* 1996;125(12):983–9.
5. Ma IW, Teteris E, Roberts JM, Bacchus M. Who is teaching and supervising our junior residents' central venous catheterizations? *BMC Med Educ* 2011;11(1):16.
6. Cavalcanti RB, Detsky AS. The education and training of future physicians. *JAMA* 2011;306(9):993–4.
7. The Accreditation Council for Graduate Medical Education. ACGME Competencies: Suggested Best Methods for Evaluation. Version 1.1. Chicago: The Council; <http://www.acgme.org/Outcome/assess/ToolTable.pdf>.
8. Ma IWY. Setting up a simulation-based procedural curriculum for internal medicine residency programs: what are the basic ingredients needed? *Can J Gen Intern Med* 2011;6(1):13–4.