

## Developing a Procedural Competency-based Assessment Tool for Internal Medicine Residents

### Purpose:

Evaluating procedural competency of internal medicine residents is critical to medical training and patient safety. Simulation-based mastery learning (SBML) improves skill retention and patient outcomes when compared to traditional “see one, do one, teach one” procedural training. Similarly, procedural checklists improve patient outcomes, enable “SMART” feedback and help quantify competency. There is evidence that Global Skills Assessments (GSA) add value by identifying pre-entrustable performance not captured through checklist-based assessments. However, there are limitations to assessing competency in a simulation setting, and standardized, real-time assessment of procedural technique in a clinical setting is needed. We believe clinical integration of a comprehensive Competency Assessment Tool (CAT) may improve rates of skill acquisition and enhance the accuracy of competency assessment. However, because uncertainty exists around what constitutes “competency” for a procedure, scoring cutoffs on a CAT require careful consideration using an evidence-based framework.

### Objectives:

We aimed to develop and implement a CAT into a novel resident procedure curriculum that adheres to the rigorous, evidence-based “Learn, See, Practice, Prove, Do, Maintain” procedure-teaching framework, using Angoff methodology to determine passing scores.

### Methods:

Design of the curriculum and CAT was informed by qualitative analysis of trainee responses to the simulation-based procedure curriculum of a local clinic. We created error-counting checklists for central venous catheter insertion (CVC), paracentesis (PCN), and thoracentesis (TCN), based on previously-published checklists and guideline-based practices refined through iterative review by local experts. In addition to procedural steps, the checklists evaluate procedural indications and contraindications, safety measures, positioning, troubleshooting complications, and interprofessional communication.

We established minimum passing standard (MPS) and unsupervised practice standard (UPS) scores using the Angoff standard-setting method. We adapted published procedural GSAs and ESs, before incorporating all three components into a comprehensive CAT with pre-established passing standards. Trainees complete the procedural curriculum comprised of pre-work and rotation-paired SBML sessions before performing the procedure clinically, and use just-in-time refresher digital resources in the hours before a procedure in the clinical setting. Trainees then perform the procedure with evaluation using the CAT. The digital CAT is accessed through a badge QR code and completed in real-time by the supervising resident during the SBML session and each clinical encounter. Then, following the procedure, the supervisor reviews the CAT with the trainee, providing an opportunity for structured, objective feedback. An email is then automatically sent to the trainee for spaced repetition and review. The curriculum and assessment tools are publicly accessible on TeachIM.org.

Results:

Angoff Standard-Setting:

27 national experts provided Angoff cutoffs for CVC, TCN, and PCN:

CVC: MPS 20/36 errors (SD 8.0); UPS 5/36 errors (SD 8.4).

TCN: MPS 24/40 errors (SD 6.8); UPS 7/40 errors (SD 7.7).

PCN: MPS 29/41 errors (SD 7.3); UPS 8/41 errors (SD 7.5).

Conclusions:

Checklists can be used in assessment by establishing a passing cutoff score through the Angoff standard setting method. This continuous competency-based assessment provides determination of entrustment on an individual level, while also serving as a teaching tool. We are currently validating inter-rater reliability of the CAT at two clinical sites before widespread implementation."