Going Beyond the Checklist with Hybrid Simulation

Peter Bulova, MD^{1,2}

¹University of Pittsburgh School of Medicine, Pittsburgh, PA, USA; ²University of Pittsburgh Medical Center, Pittsburgh, PA, USA.

J Gen Intern Med 32(6):595–6
DOI: 10.1007/s11606-017-4019-9
© Society of General Internal Medicine 2017

More and more we are seeing residents shying away from bedside procedures. They cite time, lack of experience,¹ and perhaps the conviction that there are safer places, such as interventional radiology suites, to perform procedures such as lumbar punctures. Due to advances in technology, educators now have outstanding bench model simulators to train residents in a variety of commonly performed procedures. However, this does not mean educators can assume that passing a test using an evaluator/checklist approach in a sterile idealized simulation will translate to proficient performance in the true clinical setting.

In this issue of JGIM, Dr. Mikael Henriksen and colleagues present an educational innovation that combines multiple facets of medical education.² They asked, “How do you assess competency in a standardized simulated setting in order to minimize patient risk, but assure the simulation is predictive of proficiency in a clinical setting? Is a checklist adequate for the assessor to rate competency? Is the real-world scenario recreated effectively enough in the lab to predict who can perform the procedure on a patient in typical circumstances?” They set out to develop an assessment that measures technical skill, but takes into account “extenuating circumstances” unique to the setting—in this case, a safely, compassionately, and competently performed lumbar puncture.

The authors used two distinct steps to develop their assessment innovation. They created a global rating scale (GRS) by first conducting a literature search for validated models, then combining that with a Delphi approach that involved interviewing both experts and novices in multiple specialties. They found important differences between novices and experts: for example, while novices focused on barriers to technical performance, experts focused more on the clinical environment, and while novices focused more narrowly on the ability to obtain spinal fluid, experts concentrated on factors such as pain control, patient positioning, and working with an assistant. In other words, experts focus on real-world complexities that have been implicated in lumbar puncture complications.^{1,3}

Their new assessment tool, the LumPAT, is innovative in that it combines the clinical and environmental facets of the procedure. Instead of a checklist using ratings of “completed” or “did not complete” (a validated method in multiple studies^{4,5}), a five-point scale was used, with ratings ranging from “poor” to “perfect.” The authors incorporated simulated “live” patients to assess residents’ competency with real-world interactions and environmental factors. To assess technical aspects, the procedural simulator was strapped to the back of the simulated patient at the time of the actual intervention.

Each session was graded, with 44 out of 55 points used as a pass/fail standard. There was good inter-rater reliability despite the five-point scale, which one might think would be more vulnerable to interpretation by the assessor. Other trials have also shown the inter-rater reliability to be higher with a GRS compared to a checklist.⁶

The hybrid model—combining a simulator with a human actor—adds realism to the simulation and integrates communication and technical skills, improving the experience even for those who have performed the procedure before. Combining a bench model simulator with a human actor was well described in a University of Toronto curricular innovation combining an arthrocentesis model with an actor.⁷ The Toronto study demonstrated that simulated patients add a new, important dimension to the procedure, even for those who have performed the procedure in the past. This suggests there is much to be said for stepping beyond mechanical simulation by adding a human component. To go one step farther, in Dr. Henriksen’s article in this issue, the authors take this “hybrid method” and incorporate it into the development of a new competency assessment tool.

A novel portion of this lumbar puncture training innovation is a newly crafted GRS, which the authors found could be used to assess readiness for practice.

The goal of the study was to differentiate between those with little but adequate experience and those with experience but lacking competence. The new 11-question tool combined multiple validated tools with “real-world” information gleaned from the interviews.

The authors acknowledge limitations, including small sample size and testing at a single institution, but their study notably included physicians from neurology, internal medicine, and anesthesiology. Their model needs to

be tested to determine whether this new method translates to better-performed procedures and fewer complications in the clinical setting. Nevertheless, it is an excellent example of increased realism in simulation. There is circumstantial evidence that experience with simulation correlates with improved patient outcomes, but it is not known whether hybrid simulation with a GRS is superior to less time-intensive and lower-cost simulations. There are obvious cost considerations; the authors did not provide a cost analysis for the costs of evaluators, standardized patients, and the simulator models. Certainly, not every institution will have the resources for this approach. Yet another technique that can add valuable data for the assessment of proficiency is using the simulators themselves, both human and mechanical, to provide feedback. Simulated patients can be a valuable source of feedback for learners,⁸ and the authors did not utilize this resource. Another resource-efficient source of feedback is the bench model simulator itself, which can provide objective ratings of proficiency.⁹ This would free the evaluator to focus on non-technical aspects of performance.

Beyond a model for assessing proficiency with lumbar punctures, the authors provide a model for using the Delphi method. In this case, the authors interviewed both experts and novices and used this information to create a new tool designed to take into account real-world inconveniences and complications that can affect clinical

performance. This method is likely to be reproducible with many procedures.

Corresponding Author: Peter Bulova, MD; University of Pittsburgh School of Medicine, 200 Lothrop St. 933 W MUH, Pittsburgh, PA 15213, USA (e-mail: bulovapd@upmc.edu).

REFERENCES

1. **Mourad M, Kohlwes J, Maselli J, MERN Group, Auerbach AD.** Supervising the supervisors—procedural training and supervision in internal medicine residency. *J Gen Int Med.* 2010;25:351–6.
2. **Henriksen M.** Assessment of resident readiness to perform lumbar puncture: a validation study. *J Gen Int Med.* 2017. doi:10.1007/s11606-016-3981-y.
3. **Haji FA, Khan R, Regehr G, Ng G, de Ribaupierre S, Dubrowski A.** Operationalizing elaboration theory for simulation instruction design: a Delphi study. *Med Educ.* 2015;49(6):576–588.
4. **Berg K, Riesenberger LA, Berg D, et al.** The development of a validated checklist of adult lumbar puncture: preliminary results. *Am J Med Qual.* 2013;28(4):330–334.
5. **Barsuk JH, Cohen ER, Caprio T, McGaghie WC, Simuni T, Wayne DB.** Simulation-based education with mastery learning improves residents' lumbar puncture skills. *Neurology.* 2012;79(2):132–137.
6. **Reznick R, Regehr G, MacRae H, Martin J, McCulloch W.** Testing technical skill via an innovative “bench station” examination. *Am J Surg.* 1997;173:226–230.
7. **Stroud L, Cavalcanti RB.** Hybrid simulation for knee arthrocentesis: improving fidelity in procedures training. *J Gen Int Med.* 2013;28(5):723–7.
8. **Sanko J, Shekhter I, Kyle R, Di Benedetto S, Birnback D.** Establishing a convention for acting in healthcare simulation: merging art and science. *Simul Healthc.* 2013;8(4):215–220.
9. **Pellen M, Horgan L, Barton RJ, Attword S.** Laparoscopic surgical skills assessment: can simulators replace experts? *World J Surg.* 2009;33:440–447.