

## LETTERS TO THE EDITOR

# Assessment of surgical skills training: A call for quality improvement for educators in low- and middle-income countries

## To the editor:

We read with keen interest the article by Tom R. Okello and colleagues on the assessment of their final-year medical students after Essential Surgical Skills training.<sup>1</sup> We commend the authors, the training institution, and their partners for their contributions to surgical training in the region.

In their article, the authors noted the need to evaluate the effectiveness of such training programmes in terms of skills acquisition and confidence among the trainees. Using a self-administered questionnaire, they demonstrated an improvement in the trainees' pretraining and posttraining confidence in performing a variety of essential surgical skills. Whereas confidence is required for performing surgical procedures, it is also important to assess that the taught skills have actually been acquired by the trainees in the first place. However, no measure of the actual skills acquisition was undertaken. Self-reported assessments as used in this article tend to be subjective and are prone to a number of biases. Moreover, there was no mention of the validity or reliability of the questionnaire used for assessment.

The need to assess medical skills training courses cannot be overemphasized. However, such assessment needs to be conducted in an objective manner using reliable, valid, and widely accepted tools.<sup>2</sup> Over the years, the evolution of the assessment of surgical skills training has led to development of several tools. Examples include objective structured clinical examination (OSCE), the mini-clinical evaluation exercise (mini-CEX), the System for Improving and Measuring Procedural Learning (SIMPL), and the Objective Structured Assessment of Technical Skills (OSATS), among others.<sup>2</sup>

The OSATS is regarded as the gold standard for skills evaluation.<sup>2</sup> Since it was first described nearly 20 years ago,<sup>3</sup> the OSATS tool has steadily gained acceptance around the world. It has been shown to be reliable and valid. The OSATS tool utilizes task-specific and global rating scales and is administered by trained faculty. It has been used for training assessment in settings ranging from undergraduate medical education to the training of surgical residents, and from basic surgical skills like the excision of skin lesions to more complex procedures in laparoscopic, bariatric, or ophthalmic surgery, among others.<sup>4,5</sup> Among medical students at a Korean University, the use of OSATS for assessment and feedback led to surgical skills acquisition and increased interest in students pursuing careers in surgery.<sup>6</sup> In Rwanda, the OSATS was used to demonstrate skills acquisition and improved confidence among surgical residents following a basic surgical skills course.<sup>3</sup>

The drawback of the OSATS is that it is resource intensive in terms of the time required and the number of assessors needed to administer it. This is even more important in low- and middle-income countries, where faculty who are already burdened by high clinical workloads tend to be inadequate for the number of trainees at their institutions. One randomized control trial demonstrated that trained peer assessors were not inferior to faculty assessors for assessing the acquisition of basic and intermediate surgical skills among undergraduate medical students.<sup>4</sup> Perhaps such innovations, coupled with mobile applications and other computer-based programs currently being developed, will help combat the human resource and quality challenges seen in surgical training.<sup>2</sup>

We, therefore, call upon surgical educators to continue striving for quality improvement by using robust tools like OSATS for assessment and feedback provision in surgical skills training.

Alex E. Elobu

Institute of Digestive Diseases, Kampala, Uganda  
elobuemmy@gmail.com

Nick Okwi

Busitema University, Busitema, Uganda

**Competing interests:** None reported.

## References

1. Tom R. Okello, P.M., Ghee Hwang, Michelle Sutter, Ronald Lett, Student self-assessment after Essential Surgical Skills training for final-year medical students at Gulu University, northern Uganda. *ECAJS*, 2018. 23(1): p. 18-21.
2. Bhatti, N.I., Assessment of Surgical Skills and Competency. *Otolaryngol Clin North Am*, 2017. 50(5): p. 959-965.
3. Martin, J.A., G. Regehr, R. Reznick, H. MacRae, J. Murnaghan, et al., Objective structured assessment of technical skill (OSATS) for surgical residents. *Br J Surg*, 1997. 84(2): p. 273-8.
4. Sheahan, G., R. Reznick, D. Klinger, L. Flynn and B. Zevin, Comparison of faculty versus structured peer-feedback for acquisitions of basic and intermediate-level surgical skills. *The American Journal of Surgery*.
5. Fergusson, S.J., D.M. Sedgwick, G. Ntakiyiruta and F. Ntirenganya, The Basic Surgical Skills Course in Sub-Saharan Africa: An Observational Study of Effectiveness. *World J Surg*, 2018. 42(4): p. 930-936.
6. Seo, H.S., Y.H. Eom, M.K. Kim, Y.-M. Kim, B.J. Song, et al., A one-day surgical-skill training course for medical students' improved surgical skills and increased interest in surgery as a career. *BMC Medical Education*, 2017. 17(1): p. 265.



**The authors' reply:** We applaud Elobu and Okwi's response to our article. However, we aver that the area of skills training in surgery is an area requiring more research.

Medical schools often teach clinical methods and skills, but surgery and patient safety needs more than just that, hence the need to augment efforts with numerous customized short skills courses. However, skills training, skills acquisition, and the confident and competent practice of such skills cannot be stereotyped and lacks a gold-standard assessment tool. The main question in surgical skills training assessment is whether to rely on self-assessment or external expert assessors in the absence of computer-aided assessment. However, such tools may have elements of subjectivity, and they vary in terms of reliability and validity. Currently, there is no assessment tool that uses both self-assessment and external evaluators to assess actual skills acquisition, comfort, and confidence—all of which are required for the optimal performance of surgical procedures.

Whereas Objective Structured Assessment of Technical Skills (OSATS) may be regarded by some as the gold standard for skills evaluation and has been shown to be reliable and valid, OSATS uses a global rating approach to structure the expert evaluation of technical skills using a 5-point Likert scale,<sup>1,7</sup> and it has been suggested that these scoring methods do not effectively assess the quality of the surgical result and are not reliable for technical skill competency assessment.<sup>1</sup> Another study found that OSATS focuses on post-registration assessment and is a clinical rather than a simulated competence assessment.<sup>2</sup> Furthermore, a study which evaluated OSATS and its appropriateness for evaluating clinical abilities found that self-evaluation outputs after OSATS were relatively lower than the actual scores the students received in the OSATS exam.<sup>3</sup>

Furthermore, OSATS is influenced by the subjectivity of the observer and has demonstrated poor test-retest reliability along with poor interobserver reliability, as even experienced senior surgeons have shown a high degree of discordance while using it.<sup>7</sup> However, by comparison, procedure-based assessment (PBA) has been found to be more acceptable and reliable with better construct validity.<sup>4</sup> PBA are records of direct observation of more complex procedures performed in the operating theatre, and it is thought to be a worthy gold-standard assessment tool.<sup>5,6</sup> Nonetheless, the assessment of technical skills by observation methods may be subjective and have poor test-retest reliability.<sup>7</sup> Observational assessments and studies cannot allocate by chance the risk factors for outcomes of interest and, thus, bear the challenge of observed outputs versus actual outputs.<sup>8</sup>

A self-efficacy survey instrument in which participants' satisfaction is assessed with a Likert-scale may be the alternative tool needed to overcome the drawbacks of observer subjectivity, low test-retest reliability, and interobserver variability.<sup>9</sup> Many studies in various research settings have relied

on precourse and postcourse surgical skills course self-assessments to evaluate skills transfer and level of comfort in practicing such skills. Razavi et al.<sup>10</sup> found that precourse and postcourse testing have a Cronbach's alpha of 0.92 and that a 2-tail t-test can be used to compare precourse and postcourse outputs. Another study using a precourse versus postcourse survey of the students' self-assessment scores for all skills taught found that skill levels rose from  $2.97 \pm 0.6$  to  $3.96 \pm 0.3$  ( $P < 0.0001$ ) and comfort levels in performing skills taught markedly improved by  $4.5 \pm 0.6$  relative to before the course.<sup>11,15</sup>

Although using precourse and postcourse testing may be affected by bias, Schoeb et al.<sup>12</sup> and Okello et al.<sup>13</sup> found that, overall, precourse versus postcourse evaluation was positive and, significantly, it is associated with improvements of basic as well as more complex surgical skills, theoretical knowledge, and self-confidence concerning patient-related assignments.<sup>12</sup> In another study wherein participants completed precourse, immediately postcourse, and 6-month postcourse questionnaires to assess the impact of a 2-day skills course revealed that attending the 2-day workshop improved their self-assessed preparedness to perform such skills.<sup>14</sup> Therefore, for short, simulated, bench-top, surgical skills training, a precourse and postcourse assessment offers a useful, valid, and reliable tool when mobile applications and other computer-based programs are lacking.

**Tom R. Okello**

Department of Surgery, Lira University, Lira Uganda  
okellotomrich@gmail.com

On behalf of coauthors Patrick Mugabi, Ghee Hwang, Michelle Sutter, and Ronald Lett

**Competing interests:** None reported.

## References

1. Anderson DD, Long S, Thomas GW, Putnam MD, Bechtold JE, Karam MD Objective Structured Assessments of Technical Skills (OSATS) Does Not Assess the Quality of the Surgical Result Effectively. *Clin Orthop Relat Res.* 2016 Apr;474(4):874-81. doi: 10.1007/s11999-015-4603-4.
2. Marie C. Morris, Tom K. Gallagher, and Paul F. Ridgway (2012), Tools used to assess medical students competence in procedural skills at the end of a primary medical degree: a systematic review, *Med Educ Online.* 2012; 17: 10.3402/meo.v17i0.18398. doi: 10.3402/meo.v17i0.18398
3. Mohammad Reza Mansoorian,1Marzeih Sadat Hosseiny,1,\*Shahla Khosravan,2Ali Alami,3 and Mehri Alaviani (2015) Comparing the Effects of Objective Structured Assessment of Technical Skills (OSATS) and Traditional Method on Learning of Students, *Nurs Midwifery Stud.* 2015 Jun; 4(2): e27714. doi: 10
4. Beard JD1, Marriott J, Purdie H, Crossley J. (2011). Assessing the surgical skills of trainees in the operating theatre: a prospective observational study of the methodology. *Health Technol Assess.* 2011 Jan;15(1):i-xxi, 1-162. doi: 10.3310/hta15010



5. Evgenios Evgeniou,1,\* Loizou Peter,2 Maria Tsironi,3 and Srinivasan Iyer1 (2013) Assessment methods in surgical training in the United Kingdom *J Educ Eval Health Prof.* 2013; 10: 2. doi: 10.3352/jeehp.2013.10.2
6. Jonathan D Beard (2008). Assessment of Surgical Skills of Trainees in the UK, *Ann R Coll Surg Engl.* 2008 May; 90(4): 282–285. doi: 10.1308/003588408X286017
7. Moorthy K, Munz Y, Sudip K Sarker S.K , Darzi A (2003) Objective assessment of technical skills in surgery *BMJ*2003; 327doi: <https://doi.org/10.1136/bmj.327.7422.1032>(Published 30 October 2003) Cite this as: *BMJ* 2003;327:1032
8. Boyko Edward J. (2013), Observational Research Opportunities and Limitations *J Diabetes Complications.* 2013 Nov-Dec; 27(6): 10.1016/j.jdiacomp.2013.07.007.
9. Sparks JL1, Crouch DL2, Sobba K2, Evans D2, Zhang J1, et al (2017) Association of a Surgical Task During Training With Team Skill Acquisition Among Surgical Residents: The Missing Piece in Multidisciplinary Team Training. *JAMA Surg.* 2017 Sep 1;152(9):818-825. doi: 10.1001/jamasurg.2017.1085. DOI: 10.1001/jamasurg.2017.1085
10. Razavi M., Meshkani Z. and Mahdi Panahkhahi (2004) Teaching and testing basic surgical skills without using patients, *Journal of medical education* 6(1):123-128 · October 2004.
11. Sarath Babu Gillellamudi, Pradeep Kumar & Vellanki Venkata Sujatha Implementation of Curriculum to Teach and Assess Surgical Skills for Surgical Residents, *Medical Science Educator*; Volume 20: No. 2.
12. Schoeb D.S. , Brennecke E, Andert A, Grommes J, von Trotha K. T. et al , (2016) Assessment of a course of realistic surgical training during medical education as a tool for pre-residential surgical training, *BMC Med Educ.* 16; 2016
13. Okello Tom R, Mugabi Patrick, Ghee Hwang, Sutter Michelle, Ronald Lett, (2018), Student self-assessment after Essential Surgical Skills training for final-year medical students at Gulu University, northern Uganda, *East and Central African Journal of Surgery*, Vol 23, No 1 (2018)
14. Tracey K. Asano, Claudia Soto, Eric C. Poulin, Joseph Mamazza, and Robin P. Boushey, Assessing the impact of a 2-day laparoscopic intestinal workshop, *Can J Surg.* 2011 Aug; 54(4): 223–226. doi: 10.1503/cjs.005310.
15. Denadai R, Oshiiwa M, Saad-Hossne R. Teaching elliptical excision skills to novice medical students: a randomized controlled study comparing low- and high-fidelity bench models. *Indian J Dermatol.* 2014 Mar;59(2):169-75. doi: 10.4103/0019-5154.127679.