

Training in Neurology: Implementation and Evaluation of an Objective Structured Clinical-Examination Tool for Neurology Postgraduate Trainees in Lusaka, Zambia

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Abstract

Background

We established Zambia's first neurology residency program at the University of Zambia School of Medicine and the University Teaching Hospital in Lusaka.

Objective

To evaluate the feasibility and effectiveness of a modified objective structured clinical examination (OSCE) to assess clinical skills.

Methods

The neurology training program's 3 participants completed the OSCE exercise in February 2019. We used smartphones to videotape trainees performing a physical examination and oral presentation in the neurology clinic. Trainees and faculty reviewed the videos independently using a standardized rubric and then met for in-person feedback.

Results

Three trainees completed pre- and post-OSCE surveys rating their confidence in elements of the history and examination. Trainees' average self-confidence scores improved from the pre- to post-OSCE survey in every category (pre-OSCE: mean score 6.84, range 4.8–7.8, SD 0.92; post-OSCE: mean score 7.9, range 5.67–9.33, SD 0.86). Qualitative feedback showed trainees found the OSCE helpful, routinely applied feedback, and would appreciate repeating OSCEs.

Conclusions

OSCEs improve trainees' self-confidence and can be modified and successfully implemented in a resource-limited neurology postgraduate training program. Important OSCE modifications involved using smartphones for videotaping and a real patient encounter rather than a standardized patient. Embedding the experience within a busy clinic day was practical, applicable, and efficient. Future work should expand use of OSCEs both within the Zambian neurology residency program and non-neurology training programs. Including additional video reviewers could add to the validity of clinical skills assessment. Videos could also be used for remote mentorship and teaching purposes.

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Glossary

OSCE = Objective Structured Clinical Examination.

Zambia is a lower-middle income country in sub-Saharan Africa¹ with few neurologists despite its high burden of neurologic disease. Top 10 mortality causes include HIV/AIDS, malaria, stroke, meningitis, syphilis, and road traffic accidents,^{2,3} all either primary neurologic conditions or with frequent neurologic complications. Prior to 2018, only 4 neurologists were available in Zambia, all expatriates in the capital city.⁴ The first postgraduate neurology training program was started in October 2018 at the University of Zambia School of Medicine and University Teaching Hospital with support from the Zambian Ministry of Health.

This program offers the opportunity to develop and evaluate an evidence-based curriculum in a novel setting with high patient volume but limited resources. Trainees' self-confidence and clinical growth must be fostered in an efficient, economical manner that does not compromise patient time and care. Valid clinical skills assessments create credibility for a new program and its graduates and develop momentum for the growing Zambian neurology workforce.

The Objective Structured Clinical Examination (OSCE) is a widely used method for clinical skills assessment. We describe the implementation of an adapted OSCE model to our local context and use self-confidence scores and qualitative feedback to assess its feasibility and utility in an environment with limited resources, space, and funding.

Program Description

The 2-year neurology postgraduate training program at the University of Zambia School of Medicine enrolls physicians after 3 years of internal medicine postgraduate training. The program incorporates clinical training on inpatient services with an average census of 30–50 patients and weekly outpatient clinics in which trainees typically see 10–15 patients each. In addition, trainees have 8–10 hours weekly of didactic sessions, including traditional lectures, journal clubs, research methods seminars, and case conferences. Supported by the Ministry of Health and a Fulbright fellowship, the program was developed and is directed by Dr. Deanna Saylor, a Johns Hopkins faculty neurologist.

The OSCE exercise was implemented for the program's 3 postgraduate trainees during their fifth month of clinical neurology training to allow time to obtain institutional support and adequately plan for curriculum implementation.

One day prior to the OSCE, trainees completed a survey (data available from Dryad [supplemental materials, doi.org/10.5061/dryad.2jm63xsnc]) requiring them to rank their

perceived competency in establishing therapeutic relationships, eliciting comprehensive histories, performing the neurologic examination correctly and efficiently, localizing lesions, giving oral presentations, ordering appropriate diagnostic tests, and formulating care plans. They were then videotaped performing a neurologic examination and giving an oral presentation in the outpatient neurology clinic. Real patients were used in lieu of standardized patients. Trainees chose which patient encounter was videotaped, provided it was a new patient who consented to participation. New patient encounters were used to mitigate potential bias if trainees knew return patients. Given that the exercise was formative and trainees were independent adult learners, we allowed them to choose the patient encounter.

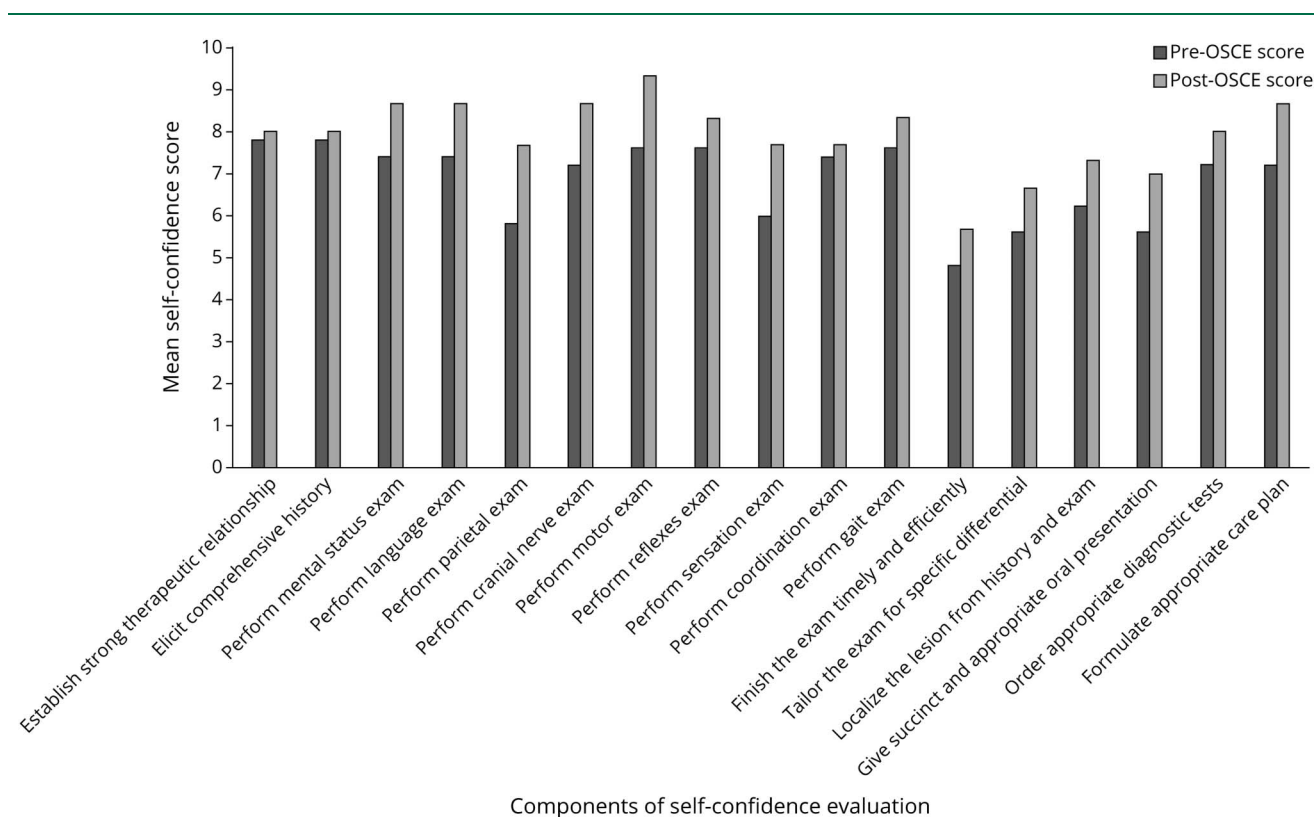
Videos were made using smartphones and immediately downloaded to a password-protected file only accessible by trainees and faculty. Within 48 hours of their clinical encounter, trainees reviewed their videos and rated themselves on their examination and presentation skills using a rubric with the same elements as the pre-OSCE survey (data available from Dryad [supplemental materials, doi.org/10.5061/dryad.2jm63xsnc]). A supervising faculty member also independently reviewed videos and completed the same rubric. The faculty member and trainee then shared and discussed their assessments to identify strengths and areas for improvement within 1 week of the patient encounter. Discussions took place in person or via telephone. OSCE videos were then deleted. Trainees completed a post-OSCE survey (data available from Dryad [supplemental materials, doi.org/10.5061/dryad.2jm63xsnc]) within 1 week of their faculty feedback session, and changes from pre-OSCE surveys were calculated. They also provided qualitative questionnaire feedback (data available from Dryad [supplemental materials, doi.org/10.5061/dryad.2jm63xsnc]) about the OSCE. The study was approved by the Johns Hopkins Institutional Review Board, the University of Zambia Biomedical Research Ethics Council, and the Zambia National Health Research Authority.

Assessment and Outcomes

Three postgraduate neurology trainees and 2 faculty members participated, which required 2–3 hours for trainees and 1 for faculty. This study had no associated costs, as we used personal smartphones, free Qualtrics survey software, and electronic rubrics.

The mean survey self-confidence scores increased in all categories (figure) post-OSCE, with most improvement in performing the parietal, motor, and sensory examinations. Average self-confidence improved from pre-OSCE to post-

Figure Change in Self-Confidence With Objective Structured Clinical-Examination Intervention



Data were gathered using pre- and postintervention questionnaires. Although $n = 3$ is too limited for t test and p value evaluations, graphical change trends in self-confidence are depicted. OSCE = Objective Structured Clinical Examination.

OSCE (pre-OSCE: mean score 6.84, range 4.8–7.8, SD 0.92; post-OSCE: mean score 7.9, range 5.67–9.33, SD 0.86). All trainees reported applying OSCE feedback in everyday clinical practice, endorsed it would “probably” or “definitely” be helpful to have periodic OSCEs, and suggested repeating the examination portion “every few months” ($n = 2$) or “every 6 months” ($n = 1$), and the oral presentation portion “more than once a month” ($n = 1$) or “every few months” ($n = 2$).

In open-ended feedback, comments included the following:

“It was helpful to see the gaps in my presentation and helped me realize how less succinct it was.”

“Great idea to have frequent OSCE practice by video. Either in-person or video feedback is very helpful.”

“It was useful in the sense that I could review faculty feedback while watching the video and I could repeatedly review my errors and good techniques [in] history presentation and examination.”

“It helps to self-assess, and with feedback from the observer, I have in visual form the changes I need to make.”

Future suggestions included videotaping oral presentations during case conferences, telephone presentations to a consultant, and taping when trainees were unaware they were being taped.

Lessons Learned

Preliminary data showed the OSCE improved trainees’ self-confidence in their clinical practice, was perceived as useful, and was worth repeating. Confidence in evaluating and managing patients is particularly important in the demanding Zambian medical environment, where high clinical demand requires trainees to adopt autonomy, adaptability, and leadership early. The OSCE provides a unique window for trainees to develop their skills, self-assess, and build self-assurance.

Our study is innovative in its inclusion of the oral presentation, an essential clinical communication skill. This modification to the conventional OSCE, which often includes only the history and physical examination, was viewed favorably among trainees. Our modifications, including using smartphones, capturing trainees in a clinic environment, and using real rather than standardized patients, enabled feasibility in a resource-limited setting. Effective OSCE curricula have been implemented in medical schools in Argentina and Pakistan using volunteer actors and faculty members as standardized patients and a learning space set apart from the clinical environment.^{5,6} However, our study is the first reported adapted OSCE in a postgraduate training program. OSCE integration in an authentic clinical environment

incorporates aspects of the Clinical Evaluation Exercise (CEX), another medical education tool with formative benefits for medical trainees.⁷ Our modified OSCE utilizes the same concept of capturing trainees in a clinical environment, but with the OSCE's heightened rigor and more standardized and substantive feedback.

Future Directions

We implemented the curriculum within a small postgraduate program of 3 trainees, and thus statistical rigor of the reported outcomes was limited. In the future, we hope to implement multiple OSCE exercises and evaluate trends in self-confidence over time while recognizing they will be influenced by other factors, including increasing clinical experience. We are working to adapt the exercise to the Zambian pediatric neurology postgraduate training program. Future application will require ongoing trainee and faculty investment, which may be challenging given time-consuming clinical requirements. However, we have integrated OSCEs within a clinic schedule to minimize extra time spent and maximize opportunities for formative feedback.

We also hope to diversify the patient encounters and clinical settings captured, implement trainees' suggestions to incorporate clinical consult and case conference presentations, and add peer and patient feedback. While not reported here due to concerns for learner confidentiality, our study included objective outcome measures in the form of a score on a standardized assessment rubric (data available from Dryad [supplemental materials, doi.org/10.5061/dryad.2jm63xsnc]), and analyzing scores over time will help gauge objective programmatic success.

Our training program is supported by visiting volunteer faculty spending 2–4 weeks in Zambia, which makes educator continuity difficult. However, this provides opportunity for a wider range of faculty feedback. Validation of the rubric's interrater reliability is needed. OSCE videos may also be helpful as educational teaching demonstrations to highlight trainee variability and appropriate feedback methods.

In the travel-limited climate of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, one valuable aspect of the OSCE videos is their ability to be used remotely for distance learning. The videotaped OSCE may be a helpful tool to support international training programs. However, inadequate Internet bandwidth and means for secure video exchange may limit implementation.

To expand the findings of our study, we hope to investigate whether this OSCE format has similar effects on increasing self-confidence in clinical neurology skills among trainees in non-neurologic specialties. If so, OSCEs may help reduce "neurophobia" among other clinicians. We hope to repeat this study with undergraduate medical students, for whom

changes in self-confidence can have a profound effect on future career specialty choices, in turn helping to expand the pipeline of future Zambian neurologists. Finally, lessons learned from our program can be utilized for educational endeavors in other settings with similar resource constraints.

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Disclosure

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Rebecca Marie DiBiase, MD, MPH	Northwestern University, Chicago, IL	Study design, major role in data collection, drafted the manuscript
Rachael Marie E. Salas, MD, MEd	Johns Hopkins University School of Medicine, Baltimore, MD	Study design, revised the manuscript for intellectual content
Charlene E. Gamaldo, MD	Johns Hopkins University School of Medicine, Baltimore, MD	Study design, revised the manuscript for intellectual content
Aparna Nutakki, BA	Rush University, Chicago, IL	Major role in data collection, revised manuscript for intellectual content
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