

Musa S
Aliyu-Zubairu R
Haliru L
Andeyansto EA
Dodo A

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Experiences with conducting the objective structured clinical examination (OSCE) as a formative tool at the end of Paediatric Posting in a new Medical School in Nigeria

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Musa S (✉)
Aliyu-Zubairu R, Haliru L
Andeyansto EA, Dodo A
Department of Paediatrics,
Barau Dikko Teaching Hospital,
Kaduna, Nigeria
Email: musa4all@gmail.com

Abstract: *Background:* Medical schools use different evaluation methods after students undergo a period of instruction for certification of acquisition of requisite skills and competencies required for registration. Despite a global trend towards adoption of OSCE format to test competencies, its adoption in medical schools in Nigeria has been relatively slow and local experiences with its use are limited. We describe the development and administration of OSCE for the formative assessment of undergraduate medical students of Kaduna state university at the end of paediatrics clinical rotation.

Methodology: OSCE was developed and conducted to assess clinical skills of 20 undergraduate medical students at the end of clinical posting in paediatrics. Students rotated through a series of clinical encounters arranged in ten stations in a circuit, each for a short duration of five minutes. Clinical tasks were carefully chosen to reflect learning objectives

of the posting using standardized patients while scoring was done using task-specific and validated checklists by the same assessors.

Results: A range of clinical competencies in different clinical scenarios, including history taking, physical examination and basic clinical skills was examined using this format.

The conduct was resource intensive with much time spent during the selection of the competencies and appropriate standardized patients to be tested, standardization of checklists, briefing assessors and choosing appropriate venue as well as preparation of stations. Unfamiliarity with OSCE by both some students and assessors was a major challenge.

Conclusions: OSCE is a feasible way of assessing a wide range of clinical competencies of medical students during paediatric rotation in our setting.

Key words: OSCE, Evaluation, Assessment, Competencies, Skills

Introduction

Barau Dikko Teaching Hospital is the newly accredited Teaching Hospital for the training of clinical students of the College of Medicine of the Kaduna State University. Different departments are required to instruct potential doctors in their areas of expertise in rotation otherwise referred to as clinical postings or clerkship, and to access them at the end of the period of posting in order to certify that they have acquired the requisite knowledge, skills and competencies required for registration as medical doctors with the Medical and Dental Council of Nigeria (MDCN).

The Department of Paediatrics plays a key role in ascertaining that only competent and knowledgeable students

with the right attitude to practice the profession are allowed to eventually graduate. One way of ensuring that students have achieved the intended and expected learning outcomes is to put them to test in all the learning domains of knowledge, skills, attitude and behaviours.¹ The evaluation of acquired clinical skills and attitudes is therefore an essential component of this assessment of clinical competency.² The newly accredited Department of Paediatrics of the College of Medicine Kaduna State University therefore needs to employ the most appropriate assessment tools for this purpose.

The tools available for both training and assessment in medical education are however continually changing,¹ which makes it necessary for the trainers, the training institutions as well as the trainees to be up-to-date with

current trends in line with best practices globally. Generally, several assessment tools of medical trainees' competencies exist.¹ The choice of a method to assess performance-based learning must necessarily be one that is potentially very good in the assessment of professional competence, including communication skills, clinical reasoning, judgement, attitudes, emotions, values and reflection.³ This is the value of the Objective Structured Clinical Examination (OSCE), which objectively assesses these domains and thus rectifies the limitations associated with the traditional assessment methods of clinical skills using the long case-short cases model.⁴ Besides assessing the competency and performance of the candidates, OSCE is said to have further benefits over traditional methods of assessment such as the conventional bedside examination methods.⁵

OSCE has been in use in many medical schools across the globe since its introduction and is now well established as effective assessment tools for clinical competence. Along with its numerous variants and adaptations, it is increasingly becoming an important part of the medical assessment process in many medical schools throughout the world.^{3,6-10} The widespread adoption of this examination method is based on decades of research and use across the globe. Its flexibility renders it a reasonable method of assessment of clinical competence which has been found useful in different cultural and geographical settings to assess a wide range of learning outcomes, in different specialties and disciplines for both formative and summative purposes.¹¹ It can further be used to assess students in the different phases of education including the early and later years of the undergraduate curriculum.¹¹

However, in spite of the general trend towards adoption of the OSCE format elsewhere, especially in the UK and the USA, its adoption and use in medical schools in Nigeria and postgraduate medical colleges in the assessment of both undergraduate and postgraduate students respectively has relatively been slow with less than 30% of medical schools in Nigeria currently using this format of assessment.¹

In this paper, we describe the development and administration of OSCE for the formative assessment of undergraduate medical students of a state university at the end of the first paediatric clinical rotation, and share our experiences with the conduct of the OSCE.

Subjects and methods

Study area

The study was conducted at the Paediatrics Department of Barau Dikko Teaching Hospital, a tertiary referral hospital, newly accredited training centre for the training of medical students of a new state university. The department was receiving its first batch of 16 undergraduate medical students for their clinical posting together with four other foreign-based medical students on elective posting.

Description of OSCE stations

Sixteen students who received clinical training at the Department of Paediatrics as part of their first clinical rotation for eight weeks and four undergraduate medical students (three from Chinese medical schools and one from a Sudanese medical school) who were on elective postings in the department at the time participated in the OSCE.

The OSCE consisted of a single carousel with seven clinical stations comprising of ten clinical encounters including three rest stations. Students were introduced in groups starting at any one of the stations and rotated round the carousel of stations until they have completed the cycle as shown in figure 1. Each station was for a short duration of five minutes. The clinical tasks for the OSCE were carefully chosen to reflect the learning objectives of the posting. Standardized patients were purposively recruited and used for the manned stations. Scoring was done by Faculty members, using task-specific and validated checklists. In that way, all candidates were objectively made to perform the same tasks in the same setting and were scored by the same examiners using the same structured scoring scheme.

Prior to the day of the OSCE, a suitable venue was identified and the assessors to man different stations as required were identified and assigned. All the required instruments to be used were assembled. Stations were clearly set up and clearly marked. Instructions and tasks to be carried out for each station were developed and printed. The sequence and flow of the students during the OSCE were determined and agreed on. Appropriate signage was placed to direct the students. Finally, checklists were developed by the examiners and standardized. On the day of the OSCE, the candidates, assessors and the standardized patients were further briefed separately. There were other support staffs, including a timekeeper with reliable stop clock and a bell, to further direct the students and ensure a smooth flow.

Station 1 was a manned station designed to test history taking skills. It aimed at assessing the candidates' ability to take focused history under observation from an 18-month old girl presenting with fever and rash. (Box 1) This was followed by a rest station, during which no clinical encounter took place.

Station 2 was also a manned station consisting of two coupled clinical encounters. In the first encounter of this station, the students' ability to obtain a focused history of convulsions from a boy was assessed. In the second clinical encounter of the station, the ability to carry out a motor neurologic physical examination of the lower limbs was tested. (Box 1)

Station 3 was an unmanned written station that was to test the ability of the students to make accurate diagnosis, outline management plans and write an appropriate prescription. (Box 2) This was then followed by another rest station devoid of any clinical encounter.

Station 4 was yet another manned, coupled station with

two clinical encounters. It assessed the students' skills in respiratory system examination in the first encounter and skill in measuring the blood pressure of a child in the second clinical encounter of the station. (Box 2)

Box 1: Structure of OSCE Stations

Station 1: History Taking

This station tests your ability to take a focused history from a patient presenting with fever and rash

Clinical Scenario: Lami Tanko is an 18-month old child presenting at the EPU with fever and rash of one week duration.

Instruction: Take a focused history of her complaints.

Station 2A: History Taking

This station tests your ability to take a focused history from a patient presenting with convulsions

Clinical Scenario: You are seeing Tunde Olowu, a five-year old boy in the outpatient department today. His mother states that he has had convulsions on their way to the hospital.

Instruction: Take a focused history of this complaint.

Station 2B: Examination

This station tests your ability to examine the Central Nervous System in the lower limbs

Clinical Scenario: Bala is a five-year old boy who complains of lower limb weakness

Instruction: Carry out a motor neurologic examination of the lower limbs.

Box 3: Structure of OSCE Stations

Station 6A: History Taking

This station tests your ability to take a focused history from a patient presenting with diarrhoea

Clinical Scenario: Ademola Wasiu is a 2-year old child presenting at the DTU with diarrhoea.

Instruction: Take a focused history of his diarrhoea.

Station 6B: Laboratory Result Interpretation

This station tests your ability to interpret a result of Urea & Electrolytes

Clinical Scenario: The following is the U & E result of Ademola

Urea	4.3 mmol/L
Sodium	139 mmol/L
Potassium	2.1 mmol/L
Chloride	102 mmol/L
Bicarbonate	24 mmol/L
Creatinine	30 umol/L

Instruction: Answer the following questions in the sheet of paper provided

- What abnormalities can you identify?
- List four signs that could be picked in Ademola
- How would you correct the abnormalities?.

Station 7: Skill – Use of Pulse Oximetry

This station tests your skills in the ability to use a pulse Oximeter

Clinical Scenario: Benjamin Tukura is a 2-year old boy who complains of cough, fever and fast breathing. He has a respiratory rate of 40 cycles per minute and SPO₂ of 84%.

Instruction: Answer the following questions in the sheet of paper provided

- What is your most likely diagnosis?
- Assuming that his SPO₂ remains at 84%, what will be your next line of action?
- List 3 other indications for oxygen therapy

Box 2: Structure of OSCE Stations

Station 3: Clinical Case Management

This station tests your ability to properly manage a case of Malaria

Clinical Scenario: Tolu Alade is a four-year old boy who was brought into the EPU in coma, having been unarousable for the past one hour. Examination revealed a pale and febrile child weighing 15kg. His temperature was 39.5°C. Side Lab blood film result showed mps ++ and a Hb = 4.1 g/l.

Instruction: Please write on the sheet of paper provided:

- What is the most likely diagnosis?
- List four other possible presentations of your diagnosis and the parameter for its definition
- Outline your management plan for Tolu Alade
- Write an appropriate prescription for Tolu Alade..

Station 4A: Skill – Respiratory System Examination

This station tests your skills in the examination of the respiratory system

Clinical Scenario: Chidi Nwosu is a ten-year old boy who complains of cough

Instruction: Carry out a complete examination of the respiratory system

Station 4B: Skill – Blood Pressure Measurement in Children

This station tests your skills in measuring the blood pressure of a child.

Clinical Scenario: Nsikan Udo is a ten-year old boy who complains of cough and left-sided chest pain.

Instruction: Measure the blood pressure of Nsikan.

Station 5: Skill – Abdominal Examination

This station tests your skills in the examination of the Abdomen

Clinical Scenario: Ayuba Nda is a ten-year old boy who presents with a 2-day history of abdominal pains

Instruction: Carry out a thorough abdominal examination of Ayuba

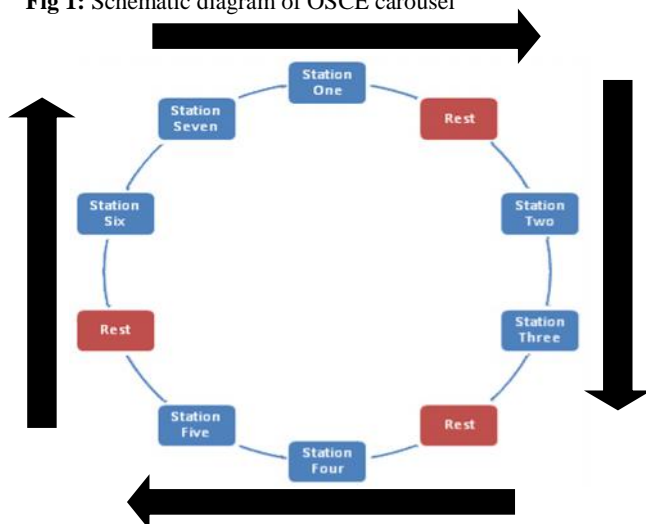
Station 5 was also a manned station that aimed at assessing the students' skills in abdominal examination as the sole encounter. (Box 2) There was a rest station following this in which no clinical encounter took place.

Station 6 was a manned station and consisted of two clinical encounters. In the first clinical encounter of this station, the students' ability to obtain a detailed history of diarrhoea was assessed, while their ability to accurately interpret urea and electrolytes laboratory results was tested as well as the ability to associate clinical signs with the electrolytes abnormality detected and the ability to correct the abnormalities. (Box 3)

Station 7 was another unmanned written station that assessed the students' ability to recognize the need for oxygen therapy in a child and the ability to appropriately use a pulse oximeter. (Box 3)

At the end of the OSCE session, assessors, support staff and the standardized patients received light refreshments as a token of appreciation for the contribution each gave towards the success of the examination. Scores were compiled by all the examiners and the results were subsequently displayed. Experiences and observations were shared among the academic staff members of the department.

Fig 1: Schematic diagram of OSCE carousel



Results

OSCE format was successfully used to examine a range of clinical competence in different clinical scenarios, including interviewing, physical examination skills, critical thinking, clinical judgments, and technical skills.

Scope of clinical competencies assessed

Overall, some of the competencies assessed in this OSCE included; history taking, physical examination, data interpretation, diagnosing, management options and prescribing. Some other competencies that were indirectly assessed include communication and interpersonal skills and professional attitude. Table 1

Station/Clinical Encounter	Competencies tested/Assessed
Station one	History taking, Communication and interpersonal skills, professionalism
Two	History taking, Physical examination, Communication and interpersonal skills, professionalism
Three	Diagnosing, Management plan options, Prescribing
Four	Physical examination, Communication and interpersonal skills, professionalism
Five	Physical examination, Communication and interpersonal skills, professionalism
Six	History taking, Data interpretation, Management plan options, Communication and interpersonal skills, professionalism
Seven	Data interpretation, Diagnosing, Management plan options

Time spent

A lot of time was spent during the planning stage of the OSCE, including the time for meticulous planning of the OSCE session. Further time was spent in the selection of the competencies and skills to be tested, the recruitment of appropriate standardized patients (SPs), formation and standardization of the checklists, briefing the assessors and the SPs. Time was additionally required for the selection of an appropriate venue that will allow for free flow of the examination without interruption. Preparation and labelling of each station to avoid ambiguities also required time of its own.

The actual conduct of the OSCE sessions was conducted in over two hours for the two rounds required to complete.

Staff and other resources needed

Conduct of OSCE was also found to be resource intensive – human and material. For the eight manned stations used in this examination, there was the need for at least sixteen different assessors, two for each station as per standard practice. This was in addition to the other support staff that took care of students' registration, attendance, as well as general invigilation for good conduct of the students during the sessions and time keeping.

Besides the examination staff, the other resources that were required include stationary used as answer sheets for the written stations, a stop clock, a bell and other miscellaneous items required for the examination stations.

Standardised Patients (SP)

These were used for the OSCE session rather than real patients partly because of the stress to which the later would have been subjected. These SPs were made to play roles simulating a clinical scenario desired for the station.

Challenges

In the absence of mannequins, the use of children as standardized patients was found to be particularly challenging. Briefing these SPs to give consistent history or to endure the rigours of the OSCE was another challenge. Another major challenge that limited the number of carousels used in this OSCE was that of finding patients with similar features for use across multiple carousels to further save time.

Finally, unfamiliarity with the OSCE format by both students and some assessors was another major challenge witnessed in the course of the OSCE.

Limitation

The present study is a descriptive narrative of experiences with the conduct of OSCE as a tool for assessing undergraduate medical students in a new medical school. It did not attempt to determine the reliability or validity of OSCE as an evaluation tool.

Discussion

This report has clearly shown that use of OSCE is feasible for the formative assessment of medical students during their paediatric postings in our setting. A 13-station OSCE comprising ten clinical encounters and three rest stations set up assessed twenty medical students at the end of their first clinical posting rotation in paediatrics.

As early as 1980 in Britain, it was shown that a solely paediatric-dedicated OSCE was possible, when an 18-station OSCE was reported.³ Prior to that OSCEs were done mostly in adult medicine or just establishing a few paediatric cases stations within OSCEs.¹²

The initial preparation for the OSCE was quite daunting and time consuming. The course coordinator had to assume the role of the departmental OSCE coordinator and thereby take full responsibility for the smooth organization of the OSCE. These included advanced practical steps, including identifying the most appropriate venue, setting up the various stations after the determination of the number and nature of the stations, numbering and labelling the stations, identifying and assigning assessors to the various stations, recruiting and briefing the standardized patients or parents and checking the equipment to be used in all stations. Other initial steps taken prior to the conduct of the OSCE are preparing and validating checklists and other sundry printing work.

The actual conduct of the OSCE took a total of 130 minutes for the 20 students to complete the circuit unlike the much shorter time of 80 minutes used to assess same 20 students in another setting.³ This was because of having fewer carousels in our case. Setting up more carousels would have shortened the time for the entire OSCE, but would have required us to have more examiners to man the stations in the additional carousels. Some other paediatric OSCEs had overcome this limitation by increasing the number of stations in a single carousel, using between 10 and 34 stations,^{5-6,11} making up for the extra manpower needed with the addition of unmanned written assessment stations.¹¹

Traditionally, educators face difficulties attempting to assess clinical qualities such as professionalism, teamwork, and expertise that have been difficult to define and quantify.² With the use of OSCE however, we were able to test a wide range of skills and competencies including three clinical encounter stations for history taking, three for physical examinations (general and focused), three for data interpretation, three for management plan, one for laboratory report (urea & electrolytes), one for prescribing and five clinical encounters tested communication skills, interpersonal relationship and professionalism. This was similar to a 10-station OSCE⁵ used to assess four domains of competence; clinical skills, problem-solving, knowledge and patient management, and the range of skills tested in the first solely paediatrics OSCE that had one station for history taking, three for physical examinations (general and focused), four for laboratory examinations (urine, x-

ray and 2 slides), five for lab reports, one for problem solving and four for questions related to the tasks performed on various stations.³ We designed OSCE stations that didn't only assess psychomotor skills but other domains of learning as well. That was possible by designing written stations for clinical reasoning, data interpretation and diagnosis. Similar designs were shown to be viable in some OSCEs.^{6,7}

Another aspect of some difficulties when conducting OSCE in paediatrics is the use of standardized patients, which is a distinguishing feature of all OSCEs.^{1,13} Standardized patients would require special training of children to act or simulate the feature that the examiners desired to be assessed. The consistency and reliability of a child simulator cannot be guaranteed, and that can compromise the objectivity of the exam. This difficulty was recognized early, which made OSCEs in paediatrics not to be as common as in adult medicine, until paediatric OSCEs or paediatric cases within OSCEs increasingly used both children and parents as standardized patients.¹⁴ In the present OSCE, this was overcome by the use of parents as informants for stations that involved history taking and real patients for physical examination stations. Similarly, some OSCEs also used either the parents at history taking stations^{14,15} or real patients^{8-10,12} as a way of overcoming the difficulties faced in the use of children as standardized patients.¹⁶

It has been reported that unfamiliarity with OSCE format could interfere with the performance of students and staff.⁶ This has been seen to be the major challenge facing young or new medical schools and training institutions like ours. It is hoped that with the introduction of the OSCE as an assessment tool in paediatric postings, students will pay greater attention to learn the necessary skills and staff will also adapt the OSCE methods to appropriately teach to reflect the real-life tasks of the doctor.

The Faculty of Clinical Sciences should also consider sourcing for some of the resources needed for a successful conduct of the OSCE by the department, such as mannequins to obviate the short-comings inherent in the use of children as standardised patients. The administration of formative and summative OSCEs in teaching programs has been shown to improve final-year medical school student's examination performance.¹⁷

Although the present study did not venture into assessing the reliability and validity of OSCE as an evaluation tool, the importance of paying attention to test content, test design, as well as implementation factors for guaranteeing OSCE is used in a valid and reliable way was previously highlighted.¹⁸ This article shares experiences about the design and implementation of OSCE for undergraduate medical students to be considered by medical educators when planning to use OSCE in similar settings as they may impact on both reliability and validity.

Conclusion

In conclusion, OSCE was found to objectively assess clinical skills of medical students on paediatric rotation in our setting including in domains not well assessed using the traditional examination methods. The design and conduct of the OSCE however is both time consuming and resource intensive. OSCE, which is used extensively globally, should be a more frequent evaluation method, and when well designed, may improve teaching and learning of the desired competencies and appropriate behaviour and skills to ensure a more professional doctor.

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