

# OSCE in Dental clinical evaluation: the report of an experience with undergraduate students

Gustavo de Almeida Logar\*; Cláudia de Oliveira Lima Coelho\*\*; Eliane Cristina Gava Pizi\*\*\*; Graziela Ávila Prado Galhano \*\*\*\*; Adrieli de Paula Neves\*; Ligia Teixeira de Oliveira\*\*\*; José Maria Bertão\*\*\*

\* MSc, Assistant Professor, Faculty of Dentistry, UNOESTE

\*\* MSc in Education, Director of the Faculty of Dentistry, UNOESTE

\*\*\* PhD, Assistant Professor, Faculty of Dentistry, UNOESTE

\*\*\*\* Post-doc, Assistant Professor, Faculty of Dentistry, UNOESTE

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## ABSTRACT

The Objective and Structured Clinical Examination (OSCE) is an exam organized in stations that simulate clinical reality. This exam evaluates students in specific tasks such as taking a medical history, physical examination, communication with patients, noninvasive clinical procedures, among other tasks. Students rotate through stations and one or two examiners score the students' performance in each task based on predetermined criteria and time to complete the task. The objective of this study was to report on the experience of applying the OSCE in an undergraduate program and how to structure it. The first OSCE for Dental undergraduate students at Universidade do Oeste Paulista (UNOESTE) was in 2016, and evaluated the competencies of the students who would enter the clinics in the following semester. The evaluation was applied to 70 students at the end of the third year and the competencies selected were Restorative Dentistry, Periodontics, Endodontics, Radiology, Biosafety, Anesthesiology and Oral Diagnosis. The OSCE can be considered an adequate evaluation technique for the attainment of clinical competences in training dental surgeons, as it provides the undergraduate student with experiences similar to the reality he will face in clinical care and his future professional performance. This assessment method gives students the opportunity to be evaluated more objectively and to learn from feedback on their performance.

**Descriptors:** Assessment. Dental Education. Dentistry.

## 1 INTRODUCTION

The world is currently experiencing frequent and rapid changes in the areas of knowledge, technology, health, and sociopolitical areas. It is necessary that a professional in the health area must be a generalist and humanist while possessing critical thinking; whose practice is based on ethics, science, integrity, citizenship, and health improvement<sup>1</sup>.

Current trends in health education point to the use of active methodologies to further student learning in which the teacher is a facilitator of knowledge; enabling the instructor to teach and assist, allowing the incorporation of biopsychosocial determinants of the health and disease process and information technology into the training process<sup>2</sup>.

The Miller pyramid principles should be considered as the choice of evaluation methods in order to evaluate the professional quality and clinical skills of a student: know (know), describe (report, describe), perform in simulated situations (demonstrate how), and perform in clinical settings (do), the highest degree of the pyramid<sup>3,4</sup>.

As there is no single evaluation method capable of achieving all of these elements (knowledge, skills, and attitudes), it is understood that only a combination of methods is capable of producing the expected results of an evaluation<sup>5</sup>.

The Objective and Structured Clinical Examination (OSCE) is organized in stations that simulate clinical reality, where students are evaluated in specific tasks, such as recording a medical history, physical examination, communication with patients, and noninvasive clinical procedures, among other tasks. The students are rotated through all of the stations and one or two examiners score their performance in

each task, using previously structured criteria and time constraints<sup>6-8</sup>.

Thus, this examination is essential for identifying gaps in the clinical skills of students and for correcting these deficiencies. In addition, this assessment allows students to reflect on their performance and provides immediate feedback on their areas of improvement and areas of success<sup>8-10</sup>.

The OSCE was initially used in Medical Schools and, in other countries, has been carried out in Dental Schools. In Brazil, this evaluation method is applied in a few undergraduate courses in Dentistry. In these courses, the OSCE is used as a pre-clinical assessment tool associated with theoretical and laboratory evaluations to verify if the student presents the minimum skills and knowledge for the clinical care of patients<sup>9,11-13</sup>.

Clinical and preclinical evaluations play four essential roles in the dental surgeon's training: 1) provide data for student self-assessment, 2) inform teachers about the success of their education, 3) certify the competence of the students, and 4) ensure the quality of health care offered to patients in dental clinics at universities and in professional practice after graduation<sup>2,14</sup>.

The preclinical phase of Dental education is important because training is performed on manikins to simulate the clinical conditions that the students will face in the care of the patients. This training is to allow the theories taught in pre-clinical courses to make sense in practice and for the student to enhance their motor skills and feel safe to attend actual patients in the clinics<sup>15-17</sup>.

Any content taught in the pre-clinical disciplines can be evaluated using the OSCE, provided it is not an invasive procedure, even in patients who need this care. However, some of these invasive procedures can be simulated on

mannequins used in preclinical laboratories and in jaws and tongues of animals, such as oxen and pigs<sup>18-20</sup>.

In addition, the OSCE can be considered an examination that follows criteria for a good evaluation, to include: validity (the degree to which the test actually assesses what it proposes), reliability (affects the reproducibility and consistency of a test), viability, and catalytic effect (promotion of results and feedback to provide better educational support)<sup>21,22</sup>. These criteria were analyzed in studies carried out by Eberhard<sup>9</sup> and Graham<sup>10</sup> who, after applying OSCE in Dental Schools and statistical analysis of the data, concluded that this test could be valid, reliable and feasible for use in Dentistry courses.

The objective of this study was to review the experience and structure of applying the OSCE in undergraduate courses.

## **2 EXPERIENCE REPORT**

The first OSCE applied in the Odontology course of Universidade do Oeste Paulista (UNOESTE) for undergraduate students was in 2016, to evaluate the competences of students who would enter the clinical cycle in the following semester.

The evaluation was applied to 70 students at the end of the third year, with the selected areas for evaluation for the OSCE were: Dentistry, Periodontics, Endodontics, Radiology, Biosafety, Anesthesiology, and Oral Diagnosis.

An evaluation committee was set up to plan the structure of the OSCE, with regular monthly meetings to decide on tasks, checklists, bills of materials, recruitment of support staff and evaluators, physical examination for the examination, logistics of confinement of students

before and after evaluation, and feedback.

The development of the OSCE was divided into phases: content determination, station development, OSCE pre-program action, OSCE day action program and OSCE action program.

### **Content determination: Blueprinting**

The first step in the development of an OSCE is to determine what should be evaluated, such as clinical skills, communication ability, diagnostic skills, and the knowledge required to act in clinical disciplines. The important fact for administering an OSCE is that the student has been presented with the content in theory or practice before being evaluated.

The number of stations to be developed depends on the purpose of the OSCE, the time and space available, and the number of students to be evaluated.

In the OSCE held in UNOESTE, stations for seven curricular components were established, 70 students were evaluated, and 8 hours were allowed for the exam and 1.5 hours for feedback, totaling 9.5 hours.

For each of the seven curricular components, two different stations were developed, as half of the students took the exam in the morning and the other half in the afternoon.

### **Station development**

It is important that the material that is part of the OSCE be listed well in advance so that it can be reviewed and tested before the evaluation.

For each station, after determining the objective of the task (figure 1), the instructions were provided to the student regarding the task to be performed at that station. The student would have one minute to read the instructions and five

minutes to carry out the proposed activities. Therefore, the guidelines should be clear and succinct, allowing the student to read and reflect within the stipulated period. The list of materials needed to assemble each station was then determined.

**OSCE pre-program action**

The dental clinics of the college were chosen as the location to perform the OSCE.

A second step in preparing for the OSCE was to recruit examiners with instructions on how to complete the evaluations (figure 2), standardize the assessment, and provide feedback at the end of the examination.

This checklist presented the items that the evaluator needed to observe; each item was also given a score: completed task (1.0), partially

completed task (0.5) and the task not performed (0.0) with a final grade of 0 to 10.

Additionally, some stations required simulated patients and mannequins. At the stations of Semiology and Radiology, simulated patients were selected for diagnosing a painful complaint and for positioning the radiographic tube head, respectively. In order to increase the reliability of the test and ensure that all students had the same simulated experience, the actors were provided a detailed explanation of their role, reading and discussion of a written script, inclusion of pertinent modifications, memorization, assessment of understanding of the situation and mastery of the script, simulations and corrections were reviewed with the evaluator for final adjustments. Finally, a dummy was used for dental laboratory practices was used for evaluating the matrix positioning procedure.

<b>Stations</b>	<b>Morning</b>	<b>Afternoon</b>
Anesthesiology	Selection of anesthetic for a dental extraction for pregnant women	Selection of anesthetic for a dental extraction for hypertensive patients
Biosafety	Correct handwashing	Placing of protective barriers
Dentistry	Selection of matrix for amalgam restoration	Selection of matrix for resin restoration
Endodontics	Taking measurements of tooth 21	Taking measurements of tooth 24
Semiology	Identification of cervical lymph node chain	Diagnostic hypothesis for mouth lesion
Radiology	Simulation of radiographic bisector technique	Simulation of Clark's technique
Periodontics	Selection of instruments for scraping teeth 23 and 37	Selection of instruments for scraping teeth 12 and 44

Figure 1. Stations used in the OSCE

Course: Dentistry	Subject: Dentistry			Period: Sixth Term
Station: Clinics	Teacher:			Date:
<b>CHECKLIST</b>				
<b>Student:</b>				
<b>Evaluator:</b>				
TASK	complete task	partially completed	task not performed	Comments
1. Perform an adequate procedure	1	0.5	0	
2. Ergonomics	1	0.5	0	
3. Correct matrix indication for the procedure	1	0.5	0	
4. Hold the sectional metal matrix with clinical clamp and carefully insert it	1	0.5	0	
5. Adaptation of the matrix. Checked height and projection in the cervical area. Placed the matrix strip in the proper position	1	0.5	0	
6. After positioning the matrix, the wedge was inserted between the matrix and the proximal face of the adjacent tooth	1	0.5	0	
7. Wedges inserted by the largest embrasure. The wedge is not inverted	1	0.5	0	
8. Use of matrix ring	1	0.5	0	
9. Good adaptation of matrix and wedge. Check: height/projection in the cervical and concavity; adaptation of the matrix in the cervical region and contact with the adjacent tooth.	1	0.5	0	
10. Made the complementary burnishing of the matrix strip against the adjacent tooth. Check the adaptation of the matrix in the cervical region and contact with the adjacent tooth.	1	0.5	0	
<b>TOTAL POINTS (maximum 10 points)</b>				

Figure 2. Checklist template

### OSCE day action program

The stations were set up the weekend before the OSCE, checking which locations would serve as stations, fixing station numbers and tasks printed on the box wall, and placing the materials and dummies for use by the student in the tasks (figure 3).



Figure 3. OSCE Station

On the day of the exam, the items checked were:

- indicating the flow in the circuit: an individual was selected who oriented the students in the stations;
- timing and audible signaling: an individual would mark the time with a stopwatch and then signal with a whistle;

- drink, food and rest area for examiners and patients: after applying the examination to the half of the class of students, of the participants were given a 15-minute break;
- confirmation of materials and equipment: materials and equipment were checked prior to the start of the OSCE; and
- distribution and collection of the checklist to the evaluators.

### Final OSCE action program

Upon completion of the OSCE, the students were gathered for feedback from the structured assessment activity. The examiners described how the proposed task should have been carried out and the main mistakes made. It was important that the student was informed of his performance as briefly as possible to reinforce the right answers, overcome deficiencies, and correct mistakes. It was important for teachers to also identify these deficiencies before the students entering into the clinical disciplines of the course.

In addition to feedback, it was important that the evaluators determine the most frequently occurring errors during the assessment and determine strategies to reinforce teaching during the semester, especially during the preclinical disciplines, so that more and more students had improved performance in the OSCE.

### 3 DISCUSSION

The evaluation of performance in a clinical environment challenges dental educators to evaluate not only technical knowledge and skills but also professionalism, time management, critical thinking, interpersonal relationships and professional ethics.

The OSCE, as a method of clinical and



preclinical evaluation, presents advantages of a more objective evaluation, selection of tasks and competencies to be evaluated in the students, and the ability to evaluate student/patient communication skills<sup>11</sup>. Mossey *et al.*<sup>28</sup> (2001) reported in their study the difficulty of objective evaluation in the clinic since the students attend different patients with different complaints and problems. Therefore, the OSCE is a more objective type of evaluation, since the same station and task are applied and evaluated in the same way for all the students by utilizing a checklist. This checklist aims to increase accuracy in detection and provide objective feedback to students because the score quantifies student performance in the assessed skills<sup>19,20,27</sup>.

In the present study, the scores of 0, 0.5 and 1 were used for 10 items to be evaluated in the session, but nothing prevents this evaluation method from having other values or that more questions are evaluated, such as in the study by Höfer *et al.*<sup>19</sup> (2013) which evaluated 8 to 14 items in each season, with scores of 0, 1 and 2.

The communication skills were observed in the performance of the stations of Semiology, in which the student interacted with a simulated patient to obtain relevant information in the diagnosis of the disease by the symptomatology, and in Radiology, where the radiographic tube head was positioned around the patient by the student.

This individual assessment of communication skills is only possible with the OSCE, due to the difficulty of accompanying individual students in the clinic, as observed by Graham *et al.* (2014)<sup>22</sup>.

The OSCE can be used to assess various skills and abilities of associated or isolated content<sup>22</sup>. For example, the preclinical curricular components of a given term or school year can be evaluated, as in our study, or as reported by Höfer *et al.*<sup>19</sup> (2013) who

applied the OSCE in Bucomaxillofacial Surgery, with ten stations evaluating different skills and abilities in this area.

However, some disadvantages of the method include minimal time at the stations, the impossibility of simulating invasive procedures in real patients, anxiety of the students, difficulty in mobilizing a large number of examiners and patients, and a high cost<sup>10,11,21</sup>.

The time of the stations was set at 5 minutes of execution and 1 minute of reading, because the number of students was high (70 students), which consumed more than 9 hours when counting the time for feedback. Some authors, like Höfer *et al.*<sup>19</sup> (2013) and Landes *et al.*<sup>20</sup> (2014), held the OSCE with a more substantial number of stations and suggested the possibility of 10 minutes at each station, as the number of students in their work was less.

Even though a questionnaire was not used to verify student anxiety, the nervousness and anxiety of many of the students were indicated by spontaneous reporting, which can be explained by the environment of the evaluation itself and for being the first time they were coming in contact with this type of examination. However, the students reported that the OSCE was a more objective and approximate assessment of the reality of clinical activity, which corroborates with the literature<sup>22,28</sup>.

A difficulty encountered in the implementation of the OSCE was the mobilization of the evaluators, a total of 14 were used since each of the seven stations had two evaluators. Höfer *et al.*<sup>19</sup> (2013) suggested that one evaluator per station could be used to minimize the number of evaluators.

The primary disadvantage of the OSCE reported by most authors and the experience of this study is the impossibility of performing invasive procedures in actual patients; therefore, these must

be evaluated with another method of evaluation<sup>11,21,24,26-28</sup>.

The final stage of the OSCE, and one of the most critical phases is the feedback session, which aims to guide the demonstrated learning and the expected learning. Discussing a student's performance at a station allows for that student to confirm, add, replace, adjust, or restructure knowledge. This feedback must be associated with a student's self-assessment. Feedback can be made at the end of the station with a stipulated time before moving to the next station or at the end of the OSCE. It is essential for the student to know as soon as possible of their successes and mistakes to reinforce the right answers, overcome deficiencies, and correct mistakes. Also, it is important to include the feedback time in the calculation of the total time for planning the OSCE examination<sup>9,21,23</sup>.

#### 4 CONCLUSION

The OSCE is an adequate evaluation technique for evaluating clinical competencies in the dental students, as it provides the undergraduate student with the experience of activities similar to the reality they will face in clinical care and their future professional performance. This assessment method provides students with the opportunity to be evaluated more objectively and to learn from feedback regarding their exam performance.

#### RESUMO

##### **O OSCE na avaliação clínica odontológica: relato de experiência com estudantes de graduação**

O Exame Clínico Objetivo e Estruturado (OSCE) é um exame organizado em estações que simulam a realidade clínica e os estudantes são avaliados em tarefas específicas como anamnese, exame físico, comunicação com paciente, procedimentos clínicos não invasivos, entre outras. É realizado o

rodízio de alunos e um ou dois examinadores pontuam o desempenho dos mesmos em cada tarefa, com critérios e tempo previamente determinados. O objetivo desse estudo foi relatar a experiência de aplicação do OSCE na graduação e como estruturá-lo. O primeiro OSCE aplicado pelo curso de Odontologia da Universidade do Oeste Paulista (UNOESTE) para alunos de graduação foi no ano de 2016, com o objetivo de avaliação de competências dos alunos que ingressariam nas clínicas no semestre seguinte. A avaliação foi aplicada aos 70 alunos do final do terceiro ano e os conteúdos selecionados foram Dentística, Periodontia, Endodontia, Radiologia, Biossegurança, Anestesiologia e Diagnóstico Bucal. O OSCE pode ser considerado uma técnica de avaliação adequada para o alcance de competências clínicas na formação de cirurgiões-dentistas, por proporcionar ao aluno de graduação a vivência de atividades similares à realidade que enfrentará no atendimento clínico e em sua futura atuação profissional. Esse método de avaliação propicia aos estudantes a oportunidade de serem avaliados de forma mais objetiva e poder aprender com o *feedback* do seu desempenho no exame.

**Descritores:** Avaliação. Educação em Odontologia. Odontologia.

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Correspondence to:

Gustavo de Almeida Logar

e-mail: [gustavologar@unoeste.br](mailto:gustavologar@unoeste.br)

Av. José Campos do Amaral 227 casa 43

190.510-80 Presidente Prudente/SP