



Introduction of objective structured clinical examination, an assessment method for undergraduate students in a dental school

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ABSTRACT

Objective: Undergraduate education in a dentistry program aims to produce competent practitioners equipped with appropriate knowledge, behavior, attitudes, and skills necessary to blend into independent dental practice. Assessment is crucial in the learning process of the students, and assessment drives learning is universally accepted. A number of traditional assessment methods are in common use; lately, objective structured clinical examination (OSCE) has been suggested to assess the clinical competencies and skills in health sciences. Argyris recommended developing an implementation strategy of advocacy, and inquiry to encourage the acceptance of personal responsibility to overcome resistance (to changes being introduced into the existing assessment system). The purpose of this study was to investigate the effectiveness of implementation strategy by measuring the attitudes of both staff and students toward OSCE in a dental school. **Materials and Methods:** Following sequential steps of providing information, advocacy, participation to minimize resistance toward the introduction of OSCE in the course of oral medicine, 14 staff members and 36 students participated in pilot/mini OSCE which included one rest and five test stations. Later, a more definitive final OSCE was designed with 10 test plus one rest station. After completion of both pilot/mini and final OSCE, a questionnaire adopted from a previously conducted study was answered by the staff and students. **Results:** The staff scores were significantly higher following the final OSCE for all the questions except "increase use." In the student group, "increase use" and "difficulty/ease" improved from pilot to final OSCE, but the difference was statistically insignificant. Comparison between the groups revealed staff was significantly more enthusiastic, believed the use of OSCE to be increased and felt the test was relevant. **Conclusion:** Involvement, participation and joint control of the staff in designing and developing the OSCE stations and its implementation led to a successful implementation of the new assessment method.

KEY WORDS: Clinical competency assessment, management of change, objective structured clinical examination, undergraduate dental education

INTRODUCTION

Undergraduate education in a dentistry program aims to produce skilled, competent and ethical practitioners equipped with appropriate knowledge, behaviors, and attitudes necessary to undertake independent dental practice. The purpose of assessment in dental education is to evaluate the students' learning outcomes and to make decisions on their progression toward becoming a competent dentist. Assessment is crucial in the learning process of students [1] and also assessment

drives learning is a universally accepted fact [2]; therefore, a planned and systematic approach of assessment would be ideal not only for assessing the desired learning outcomes but would also aid in effective learning. Various traditional methods of assessment namely direct observation, oral assessment, case problems, essays, short answer questions, and multiple choice questions have been considered to be insufficient to assess clinical skills in the field of health science [2]. The important shortcomings of the aforesaid evaluations include the lack of objectivity, reliability, the interexaminer variability, and the

limitation in competencies being assessed (such as inability to test communication skills and failure to predict the future performance of the students), also at times the unethical practice of favoritism [3,4]. In 1975, Harden and Gleeson [5] developed and introduced objective structured clinical examination (OSCE); a more sophisticated and reliable method to assess the clinical competence of health science students as it objectively measures and assesses the clinical competencies, technical skills, attitudes, and decision-making ability of the student [2,4,6].

while changing the existing (assessment) system, resistance may develop due to (i) logical, rational objections, (ii) psychological, emotional objections, (iii) sociological factors and group interests [7]. When a change in assessment method (e.g., OSCE) is planned, its introduction must be carefully implemented to gain acceptance and minimize the occurrence of defensive behavior from (dental) teachers and students [8]. Argyris recommended an implementation strategy of advocacy and inquiry to avoid and overcome resistances, monitor the effectiveness of the implementation of a change in an organization and to encourage the acceptance of personal responsibility [9]. Likewise, Plant mentioned the importance of ensuring early involvement and communication while implementing a change in dental education [7]. In light of the evidences from prior (aforementioned) studies and as no other study was conducted to date to assess the effectiveness of implementation strategy of OSCE in our setting, we set up a study to investigate the effectiveness of implementation strategy by measuring the attitudes of both staff and students toward OSCE as a new form of clinical assessment in a private dental school in Saudi Arabia following a stepwise introduction of OSCE in oral medicine course of 5th year dentistry program.

MATERIALS AND METHODS

OSCE was chosen and planned to be introduced as an additional (formative) form of assessment in the course of Oral Medicine, from the existing (dentistry) program assessment blue print manual. OSCE was chosen as it was a suitable assessment method to assess the learning outcomes and test the clinical competencies of oral medicine course [5].

Although OSCE was enlisted as clinical course assessment technique, it was essentially a new form of assessment tool in the course of oral medicine, therefore Argyris [9] recommended a model of stepwise implementation strategy [Table 1] was adopted to avoid fear and resistance against change and to ensure effective implementation. Information, participation, and commitment were used as tools to obtain effective cooperation of the staff members.

At the base line, clinical teachers and staff members of the department of basic and clinical dental sciences $n = 14$ were invited to attend a lecture on OSCE by the author, following which willingness to participate, develop and assess OSCE test stations, was enquired with the invited teachers to measure their commitment.

Further, every staff member willing to participate was asked to jointly develop OSCE stations covering various domains of course learning outcomes [Table 2]. A total of 14 staff members and teachers participated in developing and implementing the pilot/mini OSCE for the students.

After the completion of pilot/mini OSCE, the feedback and comments were reviewed to evaluate the design of pilot/mini OSCE. Following the pilot/mini OSCE, a more definitive final OSCE was designed with 10 test plus one rest station to assess the oral medicine course competencies expected from the 5th-year students. On completion of pilot/mini and final OSCE, feedback was obtained from both the staff and students with the help of a questionnaire adopted from similar study conducted in the UK [2]. The questionnaire was based on a five-point Likert scale, which contained six statements [Table 3] about the OSCE, quantifying the attitudes of staff and students toward OSCE as a method of clinical assessment. The questionnaire also contained an option for additional remarks.

The Pilot/Mini OSCE

A total number of 14 staff members were involved in developing and running the pilot/mini OSCE for 36 students. 6 OSCE stations were chosen from the list as shown in Table 2; these include five stations related to tasks in oral medicine (two stations on demonstrating clinical skills, two stations on diagnosis, and one station on interpreting patient data) plus one rest station.

Final OSCE

An outline (matrix/blue print of assessment) of the OSCE stations was established, maximum score was allocated to individual stations and the overall OSCE score was determined matching the respective domain weightage of the competencies and the learning outcome being assessed [8,10]. The competences tested were as detailed in Table 2. The students' passing scores were calculated after final OSCE from the predetermined scoring criteria as mentioned above. A total number of 88 students sat the final OSCE exam ($n = 88$) with the help of 14 staff members and five OSCE actors. After the final OSCE, feedback of the staff and students was obtained by filling in the questionnaire that was used following the pilot/mini OSCE. The study and the design were approved by Institutional Ethics Committee.

Statistical Methods

The statistical work was carried out using SPSS-11 for windows operating system. Cronbach's alpha was used to check the internal consistency (reliability) of the OSCE stations. Likert scale, an ordinal scale was used to record the response of participants to each of the six items in the questionnaire assessing their attitude toward OSCE. Therefore, a Mann-Whitney test was used to compare the attitude of different group, *viz.*, staff and students of the pilot/mini OSCE and final OSCE. We summed up the total scores of the responses to the

Table 1: Stepwise implementation strategy of OSCE as a new clinical assessment method

Time	Group	n	Action	Goal	Principal
Start	All staff	40	Seminar and lecture on assessment in dental Education by external lecturer	Information	Information
	All staff	40	Lecture on OSCE	Information on OSCE	Information
	All staff	40	Oral evaluation	Choice	Free and informed consent
+2 months	Selected staff	14	Develop pilot OSCE	Designing and participation	Participation
+3 months	All students (5 th year)	88	lecture about OSCE	Introduction to OSCE	Information
+4 months	Selected staff	14	Run pilot OSCE	Pilot OSCE for staff and student	Public testing, student participation, staff commitment
	Students	36			
+6 months	Selected staff	14	Develop and run final OSCE for students	Implementation	Participation
	Students (5 th year)	88			

OSCE: Objective structured clinical examination

Table 2: Test stations of pilot/mini and final OSCE

Station	Work performed	Type of competency	Domain of competency	Changes in final competency
1	History taking	Clinical skill	Knowledge	Design improvised
2	Examination of lymph nodes	Clinical skill	Psychomotor	Design improvised
3	Recording vital signs	Clinical skill	Psychomotor	Design improvised
4	Disease detection on photograph	Diagnosis	Cognition	Design unchanged
5	Order sialography instruments	Clinical skill	knowledge/cognition	Design unchanged
6	Bringing bad news to patient	Communication skill	Interpersonal/communication	Design improvised
7	Diagnosing radiograph	Diagnosis	Cognition	Design unchanged
8	Prescription writing	Clinical skill	Cognition	Design improvised
9	Interpreting lab report	Diagnosis	Cognition	Design improvised
10	Dental waste disposal	Clinical skill	Cognition	Station removed
11	Reduction of dislocated TMJ	Clinical skill	Psychomotor	Design improvised
12	Tracing of periodontal bone level	Diagnosis	Cognition	Design unchanged
13	Arranging set of full mouth radiograph	Clinical skill	Cognition	Design unchanged
14	Extraoral Examination of TMJ	Clinical skill	Psychomotor	Design unchanged
15	Advising patient on taking medication	Communication skill	Interpersonal/communication	Design improvised

OSCE: Objective structured clinical examination

Table 3: Six statements based questionnaire on a five-point Likert scale

Please indicate your initial feelings after the OSCE						
1. Very enthusiastic	5	4	3	2	1	Indifferent
2. Should be used much more	5	4	3	2	1	Should not be used at all
3. Apprehensive	5	4	3	2	1	Confident
Please rate your feelings toward this OSCE in general						
4. Very good test of students' skills	5	4	3	2	1	Very poor test of students' skills
5. Very easy	5	4	3	2	1	Very difficult
6. Very relevant to clinical practice	5	4	3	2	1	Very irrelevant to clinical practice

Five-point Likert scale questionnaire to evaluate the attitude toward OSCE [2] (both staff and students). OSCE: Objective structured clinical examination

following items in the questionnaire, “enthusiasm,” “increase use” and “good test” to measure the “total attitude” of staff and students toward OSCE [2]. As the total attitude score could be considered as an interval scale, a *t*-test was used to measure the differences between the 4 groups of staff and students. The level of significance for all the tests was fixed at 5% ($P < 0.05$).

RESULTS

Table 4 shows that the results of the scores of various questionnaire items filled in by the staff and students at end of pilot/mini and

final OSCE. We evaluated all the six items in the questionnaire on a total of 4 groups namely, staff pilot/mini OSCE ($n = 14$), staff final OSCE ($n = 14$), student pilot/mini OSCE ($n = 36$), and student final OSCE ($n = 88$). The internal consistency/reliability of the OSCE stations, Cronbach’s alpha = 0.73. Analysis of individual questions in the questionnaire showed the staff scores were significantly higher following the final OSCE for all the questions except “increase use.” Likewise, the student group also showed similar results; mean scores of questions, namely, “increase use” and “difficulty/ease” seem to have improved. However, the difference in score was statistically not significant. While comparing the scores between groups, staff seemed to be significantly more enthusiastic; they believed the use of OSCE should be increased and felt the test was relevant. The results showed statistically significant difference in staff and student final OSCE in all questionnaire items except enthusiasm, increase use, and difficulty/ease. Although the staff seemed to suggest increase use of OSCE after the pilot/mini OSCE, the students appeared to be more hesitant (students’ mean score of 3.67 against staff score of 4.57). The students continued to feel the OSCE format of the exam was difficult after the final OSCE also (a mean score of 2.38).

We used the sum total scores of enthusiasm, increase use and good test as a measure of “total attitude.” The staff attitude toward OSCE significantly increased from pilot/mini to final OSCE and was also significantly higher compared to the student pilot/mini

Table 4: Mean and standard deviation scores of items in questionnaire on Likert scale

Questions	Staff		Students	
	Pilot/Mini OSCE (n=14)	Final OSCE (n=14)	Pilot/Mini OSCE (n=36)	Final OSCE (n=88)
Enthusiasm	3.78 (0.42)	4.07 (0.26)*	3.27 (0.56) ⁺	3.67 (0.56) ^{****}
Increase use	3.64 (0.74)	3.78 (0.42)	2.88 (0.70) ⁺	3.07 (0.50)
Good test	3.07 (0.73)	3.71 (0.61)*	2.52 (0.77) ⁺	3.29 (0.80) ^{****}
Relevant test	4.14 (0.36)	4.57 (0.51)*	3.52 (0.97) ⁺	3.88 (0.61) ^{****}
Total attitude	3.28 (0.72)	3.85 (0.53)*	2.83 (0.60) ⁺	3.09 (0.72) ^{****}
Difficulty/ease	4.07 (0.91)	3.21 (0.80)*	3.02 (0.60) ⁺	2.78 (0.57)

*Statistically significant difference between staff pilot/mini OSCE and final OSCE, **Statistically significant difference between student pilot/mini OSCE and final OSCE, ⁺Statistically significant difference between staff pilot/mini OSCE and student pilot/mini OSCE, ^{****}Statistically significant difference between staff final OSCE and student final OSCE. OSCE: Objective structured clinical examination

OSCE. Although the student attitude toward OSCE significantly increased after final OSCE, the staff attitude after final OSCE remained significantly higher compared to student final OSCE.

DISCUSSION

We followed the model proposed by Argyris; a stepwise implementation process by providing information, followed by participation and commitment of the teaching staff in various stages of implementation. The three governing variables of this strategy include (i) Valid information, (ii) free and informed choice, and (iii) internal commitment to that choice. Argyris recommended that effective implementation requires the creation of situations where participants can jointly control the tasks and participate in designing, developing, and implementing the new method. He also advised evaluation and testing of the method in public [9]. Overall, the objective of the project was achieved to a great extent as the attitude of both staff and students toward OSCE increased after pilot/mini and final OSCE. The involvement of staff in the pilot/mini OSCE and development of OSCE scenario/stations familiarized the new assessment method. The staff accepted OSCE as a relevant test; this was indicated by mean scores of 4.14 and 4.57 on a five-point Likert scale following pilot/mini and final OSCE, respectively. Although, the student scores to most of the items in the questionnaire were significantly less compared to staff scores, the student scores significantly improved after the final OSCE except to items “increase use” and “difficulty/ease.” The potential reason for this outcome could be the students’ fear to perform the OSCE task in the presence of a faculty member as it was indicated in the additional comment section within the questionnaire; similar outcomes have been reported in other studies [11]. The students graded both pilot/mini OSCE and final OSCE (3.52 and 3.88, respectively) lower than staff, and this lower grading could be considered reasonable as similar results have been reported earlier [2]. Similarly, the “total attitude” (“enthusiasm,” “increase use,” and “good test”) toward OSCE in both groups increased significantly after the final OSCE. About 12 from 14 (85%) staff members graded 4 on a five scale after mini/pilot OSCE, and 8 of 14 staff (57%) graded 5 on five-point scale following final OSCE. Out of the 36 students who participated in pilot/mini 13 (36%) scored 4 and 54 of 88 (61.36%) students scored 4 after the final OSCE on the scale of 5. However, comparing the scores between different groups; the student scores were lower compared to staff scores,

and other studies have reported a similar trend [2,11]. The “total attitude” scores of the students may have been affected by different components contributing to it, and the students may have been nervous of the new assessment methods.

The response to the questionnaire item difficulty/ease showed a wide disparity among staff and student population in that the staff realized the ease of the exam after the final OSCE and this difference was statistically significant. The students grading of difficulty/ease from pilot/mini OSCE showed a negative trend; the students indicated OSCE was more difficult after the final OSCE, however, this negative trend was statistically insignificant. Comparison of difficulty/ease between the groups, the staff graded OSCE as being easy (4.07) after pilot/mini OSCE, but the students had a differing opinion (3.02); this difference was statistically significant. Overall, the students perceived OSCE to be a difficult form of assessment compared to the staff; this is a commonly reported trend in many other similar studies as the students perceive exams to be more difficult than the staff members [12,13]. In addition, it was the first time OSCE experience for the students, and this could have contributed to the difficulty perceived by the students.

Overall, all student scores were lower compared to the staff, and this may be due to students being relatively inexperienced with the OSCE form of assessment, fear of an untraditional assessment method and students are less exposed to diverse and real clinical situations. In our study, the students were not involved in designing the test stations; their contribution may greatly enhance the design and development of the OSCE stations and also help in alleviating their fears. Other possible influences could be the students’ perception of the given OSCE test scenarios, the time set for each test station (5 min/station), difficulty in understanding the questions as they were less objective and students were unable to understand what would be the right response [14]. The shortcomings of our study include a small sample, and we did not compare the score of the OSCE format of exams as against the traditional format of the exam. Therefore, further studies are recommended to overcome the aforementioned shortcomings.

CONCLUSION

Analysis of data obtained from a private dental school to assess the effectiveness of implementation strategy by measuring

the attitudes of staff and students toward OSCE revealed the implementation strategy of a new assessment method was effective and successful. Gaining the cooperation of staff and overcoming the resistance to change was also achieved.

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