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ORIGINAL RESEARCH

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Global curricular innovations at Rehman Medical College, Peshawar: The case for mini-clinical evaluation exercise

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ABSTRACT

Background: The impact of undergraduate mini-clinical evaluation exercise (mini-CEX) training on graduate workplace-based assessment is not well documented.

Objective: The aim of this study is to evaluate trainee and assessor impressions of undergraduate mini-CEX training on clinical performance of Rehman Medical College (RMC) graduates posted at two affiliated teaching hospitals in Peshawar, Khyber Pakhtunkhwa, Pakistan.

Methods: The cross-sectional study, conducted at RMC, Peshawar, and its two affiliated teaching hospitals from January to February 2017 through universal sampling included 96 house officers (48 RMC graduates with mini-CEX experience and 48 graduates of other medical colleges without mini-CEX experience) and their 12 clinical consultants. Two questionnaire-based surveys (faculty and graduates) were conducted to evaluate the clinical performance, utilizing Kirkpatrick's model for evaluation. A data analysis was performed by SPSS 22.0 for descriptive statistics.

Results: The faculty survey for evaluating graduate performance yielded the significant scores for attitude ($p = 0.02$) and work ethics ($p = 0.002$) of RMC graduates; 58.3% of the faculty regarded mini-CEX as a valuable tool for improving clinical skills, attitude, and perceptions during undergraduate clinical training. RMC graduates ($p < 0.001$) attributed their preparedness, attitudes, work ethics, confidence, punctuality, and response to duty to mini-CEX; 50% agreed that mini-CEX can be a good tool for formative assessment in undergraduate clinical training.

Conclusion: Undergraduate mini-CEX training can be used as a valid, feasible, and reliable tool to assess professional workplace-based performance of graduates.

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Formative assessment, outcomes, mini-CEX, workplace-based assessment.

Introduction

Assessment is a driver for learning and constitutes the mainstay of education. There have been a number of reforms in assessment in medical education over the course of time, and multiple methods have been used to promote learning by utilizing a form of assessment "for" learning rather than "of" learning [1]. The mini-clinical evaluation exercise (mini-CEX) is a formative workplace-based assessment (WPBA) that enables the trainer to get feedback from the assessor at the time of assessment and can take place in 15–20 minutes with a variety of patients in a variety of settings [1–6]. Mini-CEX has inherent assessment criteria that make up for the deficiency in assessment for clinical skill content noticed in objective-structured clinical examination (OSCE) as well as long cases and short cases, by evaluating the trainee in history taking, physical examination, communication skills, counseling, and procedural skills, supplemented by an inbuilt feedback mechanism, and could help to improve professional behaviors of trainees/students [1,3,7–11]. Literature has identified mini-CEX as a valid and reliable structured formative assessment tool that enables an examiner to directly observe and assess a student while he/she performs skills according to set criteria [2,3,12–14]. With recent trends toward an outcome-based medical education, it is

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imperative to have the means of formative WPBA that continually ensures student learning with enhancement and development of competencies for patient safety [7,15,16].

Mini-CEX has inbuilt provision for the identification of gaps in learning through on-site feedback, and a continuous learning process is possible through feedback of both assessor and trainee at the end, thus providing trainees with an opportunity to rate the assessor [3,17–19].

In the current WPBA for undergraduates in Pakistan such as OSCE and a direct observation of procedural skills, feedback on assessed skills is missing even in postgraduate training, as mentioned by other authors as well [20,21]. Mini-CEX ensures direct observation, which is of shorter duration, with prompt feedback provision, thus assisting in learning new knowledge and behaviors [11]; in addition, it is valuable for workplace-based formative assessment as it assesses the student at the highest "does" level of Miller's pyramid that is not possible with tests of memory reproduction [11,17,20]. It enables the students in developing new knowledge through identification of gaps in existing one [8,11].

RMC implemented mini-CEX for its final professional MBBS students in 2015. The standardized format of mini-CEX was implemented at RMC after review by experts and training of students and assessors. It was the first medical college in Khyber Pakhtunkhwa province to implement mini-CEX for WPBA. The utility of mini-CEX is reported in literature; however, its effect on performance in practice needs further research [22]. This observational study evaluates trainee and assessor impressions of the introduction of mini-CEX evaluations for training among medical graduates in Pakistan.

Materials and Methods

The cross-sectional descriptive study was conducted from January to February 2017 at two teaching hospitals affiliated with Rehman Medical College (RMC), Peshawar, on 48 graduates of first batch of RMC serving as house officers, along with their 12 consultants from the Departments of Medicine, Ob/Gyn, Surgery, Dermatology, Cardiology, and Neurology. In addition, 48 graduates from other medical colleges without mini-CEX training who were working in the affiliated hospitals were also selected for comparison.

Survey questionnaires were developed using Kirkpatrick's evaluation model for performance and distributed to faculty who were assessors in conducting mini-CEX and to graduates doing house job training. The four levels of Kirkpatrick's model (reaction, learning, behaviors, and results) were used to develop the questions of the survey questionnaire. The questionnaire contained nine questions: question 1 contained six subitems of general professional attributes to compare RMC and non-RMC graduates, whereas question 5 was open-ended and qualitative in nature to get feedback from faculty and graduates. The other seven questions were related to evaluation of the effectiveness of mini-CEX in developing professional abilities and skills. For question 1 and its six subitems, 48 non-RMC graduated house officers were also included to get comparison data. The filled questionnaires were collected by the Department of Medical Education (DME). An informed consent was obtained from all subjects of the study, and a confidentiality of the data was maintained. Ethical approval was obtained from the college ethics committee.

The graduates were informed from the Department of Medical Education through selection of a key person, who was included in the study, and through them, all the other subjects were contacted. Consent was obtained from all subjects, and the questionnaires were distributed by hand through DME personnel. The clinical faculty was informed by DME about the research through email, and the questionnaires with consent forms were distributed to their clinics which were collected on completion by DME.

Data were analyzed by SPSS 22.0 for descriptive statistics. The main variables were the responses of consultant faculty and house officers in terms of their clinical performance. In addition, the responses of RMC graduates were compared with non-RMC graduates who were also doing their house jobs in RMC affiliated teaching hospitals. The paired sample *t*-test was used to compare the responses by considering $p \leq 0.05$ as significant.

Results

Responses of the two surveys are shown in Tables 1–5.

In the faculty responses to question 1 and its six subitems, it is seen that the work ethics of RMC graduates ($p = 0.02$) and attitude of the RMC graduates toward teachers and colleagues was better ($p = 0.002$) than other graduates (Table 1).

The responses of faculty to questions 2–4 and 6–9 were based on a Likert scale (1= poor, 2 = fair, 3 =average, 4 = good, and 5 = excellent). In general,

faculty agrees with the usefulness of mini-CEX in developing professional abilities and skills of graduates; this is also reflected in the mean scores obtained for the questions. There was 50% and above agreement on the benefits of mini-CEX as a formative assessment tool in workplace-based learning (Table 2).

Regarding question 5 (open-ended, qualitative), nine faculty members responded to the aspects of behavior of RMC graduates that were different from non-RMC graduates, six (66.67%) gave positive remarks about RMC graduates, two (22.2%) gave negative opinions about RMC graduates, and one (11.1%) said that they were the same as non-RMC graduates.

For comparative assessment of scores of RMC and non-RMC graduates based on their responses to the six general attributes of question 1, all participating graduates agreed ($p < 0.001$) that the RMC graduates had better preparedness, work ethics, better attitude toward colleagues/teachers, punctuality, and responsibility toward duty (Table 3).

For the responses to question on Likert scale of RMC graduates to questions 2–4 and 6–9, the modes of responses indicate a neutral opinion of graduates

Table 1. Mean scores of faculty responses to performance evaluation questionnaire (n = 12).

#	Question 1 items	RMC graduates Means ± SD	Other graduates Mean ± SD	*p*-value (paired samples *t*-Test)
1	Preparedness for learning	3.25 ± 0.622	2.75 ± 0.965	0.166
2	Attitudes to teachers	3.75 ± 0.866	2.92 ± 0.793	**0.025**
3	General work ethics	3.42 ± 0.515	2.58 ± 0.793	**0.002**
4	Confidence in learning	3.58 ± 0.900	3.08 ± 0.900	0.191
5	Attitude to attendance	3.00 ± 01.265	2.75 ± 1.215	0.810
6	Response to demands of duties	2.83 ± 1.403	3.17 ± 1.115	0.368

Table 2. Mean scores of faculty responses to performance evaluation questionnaire (n = 12).

Q. #	Questions 2–4	Mode	Mean	SD
2	Regular mini-CEX has modified fresh graduate attitudes and perceptions of clinical practice as doctors	Agree (58.3%)	3.33	0.985
3	RMC graduates have a better knowledge and skills due to persistent mini-CEX	Agree (58.3%)	3.50	1.087
4	Professional behavior of RMC graduates modified compared to other graduates	Agree (50.0%)	3.17	1.030
6	Regular mini-CEX changed the organizational skills of RMC graduates	Neutral (50.0%)	3.08	0.900
7	Mini-CEX is a good assessment tool for improving clinical skills of students	Agree (58.3%)	3.92	0.669
8	All undergraduate hospital rotations can benefit from mini-CEX as formative assessment	Agree (41.7%)	3.67	1.155
9	Mini-CEX assessments can have benefits for patients after graduation	Agree (50.0%)	3.64	0.809

Table 3. Mean scores of RMC and non-RMC house officer responses to question 1 (n = 96).

#	Question 1 items	RMC graduates Mean ± SD	Other graduates Mean ± SD	*p* value (paired sample *t*-test)
1	Preparedness for learning	3.73 ± 0.917	2.60 ± 0.857	<0.001
2	Attitudes to teachers	3.81 ± 1.045	2.60 ± 0.929	
3	General work ethics	3.75 ± 0.863	2.73 ± 0.997	
4	Confidence in learning	3.83 ± 0.808	2.86 ± 1.037	
5	Attitude to attendance	3.91 ± 0.775	2.55 ± 0.951	
6	Response to demands of duties	3.77 ± 0.928	2.45 ± 1.022	

Table 4. Mean scores of RMC graduated house officer responses to questions 2–4 and 6–9 (n = 48).

Q. #	Questions	Mode	Mean	SD
2	Regular mini-CEX has modified fresh graduate attitudes and perceptions of clinical practice as doctors	Agree (18; 37.5%)	3.13	0.890
3	RMC graduates have better knowledge and skills due to persistent mini-CEX	Neutral (17; 35.4%)	3.13	0.914
4	Professional behavior of RMC graduates modified compared to other graduates	Neutral (21; 43.80%)	3.10	0.905
6	Regular mini-CEX changed the organizational skills of RMC graduates	Neutral (50.0%)	3.17	0.907
7	Mini-CEX is a good assessment tool for improving clinical skills of students	Agree (18; 37.5%)	3.43	0.972
8	All undergraduate hospital rotations can benefit from mini-CEX as formative assessment	Agree (24; 50.0%)	3.44	0.943
9	Mini-CEX assessments can have benefits for patients after graduation	Agree (19; 39.6%)	3.52	0.945

Table 5. Typical responses of faculty and graduates to Question 05.

Question 05	Response
Which aspects of their (RMC graduates) behavior are different than graduates/ medical officers/trainees of other institutes?	*(Faculty Respondent #1)* *RMC Graduates are punctual and polite.* *(Faculty respondent #2)* *Our students are punctual, well-behaved, and polite with seniors and patients.*
Which aspects of your (RMC Graduates) behavior are different than graduates/ medical officers/trainees of other institutes?	*(Graduate Respondent #1)* *We (RMC graduates) have better work ethics than other graduates.* *(Graduate respondent #2)* *We (RMC graduates) are better prepared for the daily tasks and take responsibility for our work.*

and also reflected in the mean scores obtained. There is only weak agreement with the usefulness of mini-CEX in improving professional abilities and skills, positive effect of mini-CEX on organizational skills in RMC graduates, and benefits of mini-CEX as a formative assessment tool for undergraduate work place-based learning (Table 4).

Regarding question 5 (open ended, qualitative), 34 RMC graduated house officers responded to the aspects of behavior of RMC graduates that were different from non-RMC graduates, 31 (91.2%) gave positive remarks about RMC graduates, 2 (5.9%) gave neutral opinions about RMC graduates, and one (2.9%) said that they were the same as non-RMC graduates (Table 5).

Discussion

As an assessment tool, the results were in line with most of the literature reviewed for the study. It was found that mini-CEX can help to promote learning and behaviors as seen by the better work ethics (consultant survey, p = 0.02) and behaviors of graduates (consultant survey, p = 0.002) of RMC graduates as compared to graduates who had not taken mini-CEX. This was in line with the studies cited for the research [3,7–9]. The reason is the inbuilt feedback mechanism of the tool that identifies gaps in knowledge and skill at the time of assessment and helps to improve student learning. The students who had undertaken mini-CEX regarded themselves better in most of the areas of performance identified through Kirkpatrick's model. The reason could be repeated and continued exposure to being assessed for main clinical skills throughout undergraduate training. There was an agreement among 50%–58% of faculty members who undergraduate mini-CEX can help improve the clinical skills, organizational skills, attitudes, and behaviors of students and can have benefits for patient safety as well (Table 5). Similar findings have been reported by other authors [3,17–19].

Of the graduates, 50% agreed that undergraduate mini-CEX can improve the clinical skills and skill-based learning of students, similarly reported by other authors [17,20].

This preliminary study sheds light on the role of mini-CEX in the attainment of desired level of performance needed for patient safety and good medical practice, an area identified through literature as requiring research [21]. However, since the mini-CEX was only implemented for final year students, its implementation for 4th year and 3rd year as formative WPBA, which is an assessment for learning in clinical setups, needs to be researched. A small number of faculties responded to survey questionnaires, so a bigger faculty/assessor sample may further help in establishing in its validity and reliability and its impact on performance for graduates. A close exploration and evaluation of the different criteria of mini-CEX can further help in understanding its utility for enhancing performance in clinical practice.

Limitations of the study

The complete class of 100 graduates could not be accessed, which led to a smaller sample size. Similarly, all consultants who were engaged in taking mini-CEX in the undergraduate hospital teaching did not respond, leading to a smaller faculty presentation as well. Moreover, long-term assessment of mini-CEX retention could not be ascertained.

Conclusion

Mini-CEX proved to be a valid and reliable modality for WPBA for learning; it is feasible to implement, is easily monitored, and leads to improved outcomes for all domains of learning through its individual criteria.

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