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RESEARCH ARTICLE

Use of mini-CEX as a teaching learning method in physiology for undergraduate medical students

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ABSTRACT

Background: Most of the assessments of medical students are at the end of the term or year leaving hardly any scope for feedback. Mini-clinical evaluation exercise (mini-CEX) is a hybrid tool that allows assessment as well as immediate feedback from a knowledgeable assessor which is its main strength. At NKPSIMS and RC Nagpur it was observed that Undergraduate medical students in physiology practicals show underperformance in clinical physiology section especially. The feedback part associated with mini-CEX made us think to use it as an assessment and learning tool in physiology as it gives immediate feedback to the students, there is one to one interaction between the teacher and student and students are made accountable for their own learning. **Aims and Objectives:** (i) To improve clinical examination skills of I MBBS students, (ii) To improve the performance of the students in clinical examination of respiratory system in physiology, (iii) To give constructive feedback to the students, and (iv) To make the students accountable for their own learning. **Materials and Methods:** 75 students of I MBBS 2014 batch were included in the study and 150 encounters were planned. Students were taught clinical examination of respiratory system and were called twice in next 2 successive weeks. Each student was assessed twice with a check list for the competencies required and providing feedback. The standard nine-point scale was adopted for rating the students. The data collected during all the encounters was analyzed. **Results:** The scores in all the 5 competencies (inspection, palpation, percussion, auscultation, and communication skills) in the 2nd encounter shows a significant improvement which was statistically significant ($P < 0.001$). **Conclusion:** We have successfully implemented mini-CEX as a teaching learning and assessment tool for undergraduates and found its feasibility and acceptability for preclinical subjects.

KEY WORDS: Mini-clinical Evaluation Exercise; Teaching Learning Tool; Physiology Practical; Undergraduate Medical Students

INTRODUCTION

The assessment of medical students both at undergraduate and postgraduate level leaves much to be done. Most of the assessments are at the end of the term or year leaving hardly any scope for feedback. Another issue is the students are not observed during the process of history taking or physical examination or any procedure. Feedback exerts one of the most important influence on learning.[1] A meta-analysis by Hattie also mentioned that feedback has the single most influence on achievement.[2] Similar findings were reported by Veloski et al.[3]

Mini-clinical evaluation exercise (mini-CEX) is a hybrid tool that allows assessment as well as feedback at the same time. The main strength of mini-CEX is to provide immediate

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feedback, related to the task from a knowledgeable assessor.[1] Most of the problems of the assessment can be overcome by the mini-CEX, developed by the American Board of Internal Medicine.[4] The mini-CEX involves direct observation of a trainee in a focused clinical encounter, followed by immediate feedback. The assessment is recorded on a rating form that has been shown to have high internal consistency and reliability among internal medicine trainees, giving scores comparable with a high-stake clinical examination.[5,6] The mini-CEX has higher fidelity than other formats.[7]

Mini-CEX is a rating scale developed by the American Board of Internal medicine to assess six core competencies of residents: Medical interviewing skills, physical examination skills, professionalism, clinical judgment, counseling skills, organization, and efficiency.[4] Mini-CEX is a relatively new tool for assessment and it has an advantage of having an in built mechanism of providing instant feedback to the students.[1] Mini-CEX provides feedback to the student on skills essential to the provision of good clinical care. The method when used in formative assessments improves the competencies expected and the confidence level of the student.[8]

There has been limited or almost negligible research about the feasibility of mini-CEX for the undergraduate students and also in preclinical subjects.

Our experience of last many years in physiology practical examinations was the underperformance of I MBBS students in clinical physiology section. The feedback part associated with mini-CEX made us think to use it as a teaching learning tool in physiology as it gives immediate feedback to the students, there is one to one interaction between the teacher and student and students are made accountable for their own learning.

To the best of our knowledge, no study has examined the use of mini-CEX as a teaching learning method in India.

Through this study, we share our experience with use of mini-CEX as teaching learning method in the Department of Physiology, NKPSIMS and RC Nagpur.

Aims and Objectives

1. To improve clinical examination skills of I MBBS students;
2. To improve the performance of the students in clinical examination of respiratory system in physiology;
3. To give constructive feedback to the students; and
4. To make the students accountable for their own learning.

MATERIAL AND METHODS

Seventy-five students of I MBBS 2014 batch were included in the study by random sampling and 150 encounters were planned. Prior approval was obtained from the Institutional Ethics Committee.

Mini-CEX checklist and feedback questionnaires were designed by the physiology teachers of the department and was validated by the MEU Faculty of the institute. A faculty training program was conducted on mini-CEX and also on giving constructive feedback to the students in the Department of Physiology. Clinical examination of respiratory system was taught to the students in a regular way. Seven groups of students were created and one teacher was made facilitator for one group. Students were told to revise the practical and were called twice in next 2 successive weeks. Each student was assessed twice with a check list (Table 1) for the competencies required on a 9 point Likert scale [1-3 (Unsatisfactory), 4-6 (SATISFACTORY), 7-9 (excellent)] and providing feedback. The data collected during all the encounters was analyzed.

Mini-CEX Checklist (Table 1)

Traditionally mini-CEX checklist is based on 6 core clinical competencies. In this project, we modified the checklist as per the requirements of I MBBS students as these are preclinical students and also the mini-CEX intervention was planned only for a single practical of clinical examination of respiratory system. The competencies selected were communication skills (in the form of explaining the procedure and giving instructions to the subjects), inspection, palpation, percussion, auscultation, and vocal resonance.

RESULTS

A total of 110 encounter were recorded as against a planned figure of 150 giving a completion rate of 73.4%. The evaluators for the encounters were Professor (1), Associate Professor (2), and Assistant Professors (3). The competencies assessed are shown in Table 1.

The mean observation time was 10 min and another 10 min were required for giving feedback. In addition, a feedback on the intervention was obtained from the students on a feedback questionnaire on:

- Satisfied with the intervention
- Felt anxious on being observed
- Time allotted for performing the clinical examination and giving feedback
- Usefulness of the feedback.

There was a significant improvement in all the 5 competencies in the 2nd encounter which was statistically significant (Table 2).

Majority of the students were satisfied with the intervention (90%) and they were extremely happy about the feedback (100%) and found it very useful for all other practices. The

students found the time allotted was adequate (80%) and 60% of students were anxious about the process.

Table 1: Checklist

Skills	Encounter I	Encounter II
Communication skills (instructions to the subject)		
Inspection (size and shape of the chest , rate of respiration, equality on both sides, abnormal bulging or depression, dilated vessels, apex beat)		
Palpation		
Trachea		
Apex beck		
Rate of respiration		
TVF		
Movements of respiration		
Percussion		
UBLD		
Lower borders of lungs		
Anterior		
Lateral		
Posterior		
Auscultation		
Bronchial breathing		
Vesicular breathing		
Anterior		
Lateral		
Posterior		
Vocal resonance		

Rating scale: 13: Unsatisfactory, 4-6: Satisfactory, 7-9: Excellent

DISCUSSION

Mini-CEX is a widely used tool of assessment which includes structured assessment of an observed encounter, provides feedback to the students on skills and improves competencies expected and the confidence level of the students. It is a hybrid tool that allows assessment as well as feedback at the same time. The main strength of mini-CEX is to provide immediate feedback, related to the task from a knowledgeable assessor.

This study proves that the successive encounters definitely help to improve the various deficient areas and the competencies lacking in the students. The main purpose of the present study was to expose the students and the faculty to feedback in the form of formative assessment. Immediate feedback boosts the students in correcting themselves and positive approach was taken by them. Some students realized that even the encounters had taught them new things. This method also helps to improve student-teacher and student-patient relationship as the method is used in one to one teacher student interaction. All the students agreed to face this type of learning intervention in future. A large number of medical schools in the west use this tool for residency assessment.[9] Few more studies have reported successful use of mini-CEX as an assessment tool for residents and postgraduates.[10] In one of the studies, it was reported that even participating as a preceptor in a mini-CEX has a positive impact on the preceptor's professional development.[11] T. Singh also reported that mini-CEX is an acceptable and practical tool for assessment of residents. It is a low expertise, low resource intensive method that does not require any special preparation.[1] According to this study, faculty training is an important component in mini-CEX as the quality of

Table 2: Comparative study of the scores obtained in various competencies in mini-CEX encounters

Competencies	Mean±SD	Standard error mean	Difference mean	Standard error mean	*T*	*P*
Pair 1						
Inspection I	3.52±1.046	0.209	2.36	0.128	18.50	<0.001
Inspection II	5.88±0.971	0.194				
Pair 2						
Palpation I	3.52±1.046	0.209	2.22	0.141	15.56	<0.001
Palpation II	5.72±1.100	0.220				
Pair 3						
Percussion I	3.44±0.870	0.174	2.12	0.226	9.38	<0.001
Percussion II	5.56±1.003	0.201				
Pair 4						
Aus I	4.28±1.137	0.227	2.04	0.204	10.00	<0.001
Aus II	6.32±1.314	0.263				
Pair 5						
CS I	4.68±1.547	0.309	1.8	0.216	8.33	<0.001
CS II	6.48±1.122	0.224				

Mini-CEX: Mini-clinical evaluation exercise, SD: Standard deviation

feedback determines the quality of benefits that residents derive from an encounter.[1] And so training of the assessors is an important strategy in mini-CEX.[12] The opinion of the faculty regards training also holds true in one more study which states that the mini-CEX appears to be a reliable and acceptable assessment tool of clinicians in the workplace, and is a valuable method of identifying which candidates may have problems in a clinical situation. Most IMGs were satisfied with their feedback. Examiners reported that this was the most important part of the mini-CEX. However, they would have preferred more training in this task.[13]

There is only one study where mini-CEX is used for undergraduate studies in ayurveda where 2nd BAMS students were included in the study. The authors found the mini-CEX as an effective tool of assessment in second B.A.M.S. students in Rognidan to improve the expected competencies in case presentation skills with confidence.[5]

We successfully implemented this tool for undergraduates and found its feasibility and acceptability for preclinical subjects.

Limitations of the Study

Our study is limited to one institute and that too one subject. Many more studies like this can throw light on more dimensions of mini-CEX.

CONCLUSION

The mini-CEX is the effective tool of teaching learning and formative assessment for undergraduate students and it can be used in preclinical subjects. The method helps to improve the expected competencies in clinical examination skills with confidence.

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