

Original Research Article

Mini-Clinical Evaluation Exercise as a Formative Assessment Tool in Undergraduate Medical Training: A Study of Student and Faculty Acceptability

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ABSTRACT

Background: Mini-CEX evaluation exercise is a workplace-based assessment method which evaluates a medical student's clinical acumen, behaviour and professionalism. Every aspect of a clinical encounter is evaluated at mini-CEX. It involves history taking & interviewing skills, physical & clinical examination skills, clinical judgement, counselling skills and overall professionalism. The process includes a short observed clinical interaction by a medical student with a live patient & the whole process is observed by an assessor at bedside who after the encounter is over provides structured feedback to the student. The feedback form is a rating chart where the assessor marks the trainee's performance across the pre-defined competencies using a standardized & structured rating scale. The immediate feedback by the assessor provides scope for further learning & skill improvement.

Aims: To assess the acceptability of the Mini-Clinical Evaluation Exercise (mini-CEX) as a formative assessment tool among final MBBS students and faculty members

Methods: A cross-sectional observational study was conducted in six months duration in the department of medicine to study the acceptability of mini-CEX amongst students of final MBBS and faculties of medicine department after obtaining permission from IEC. 25 medical students were selected by systemic random sampling. Following sensitization and informed consent each student underwent a mini-CEX encounter assessed by a trained faculty using a nine-point standardized mini-CEX rating scale. Clinical skills, clinical acumen, communication skills, clinical judgement and overall professionalism were evaluated during the 20 mins encounter followed by immediate feedback and the rating chart being handed over to the student. Acceptability of this encounter was assessed by using five-point Likert scale based on structured & validated questionnaires covering multiple domains for acceptability. Data were analysed using descriptive statistics & Chi-square test.

Results: Acceptability of mini-CEX among students was assessed across four domains: satisfaction level, educational impact, assessment utility and psychological perception. The mean sentiment scores for these domains were 3.56 ± 1.19 , 4.08 ± 0.97 , 3.82 ± 1.32 & 3.32 ± 1.57 , respectively. These findings indicate students have positive perception of mini-CEX regarding its educational value and its utility as an assessment tool. Psychological impact remained neutral likely reflecting the direct observation component of the process. Statistical analysis revealed a significant association with immediate feedback in mini-CEX ($P < 0.05$) & it's linked with improved students' performance with greater awareness of individual's strength & weakness. Faculty perception scores across the same

domains were 3.60 ± 0.28 , 3.20 ± 0.51 , 3.29 ± 0.67 & 3.00 ± 1.58 , showing broadly similar trends, though faculty perception regarding its utility as educational tool and assessment method appeared more reserved. The overall acceptability score was 3.70 ± 1.19 among students & 3.27 ± 0.76 among faculty, indicating a positive perception in both two groups.

Conclusion: Mini- CEX is a feasible and well accepted tool for formative assessment in clinical settings with particular strength in providing immediate feedback, which ensures students' learning & improves performance. Its integration in learning module will improve clinical competence however adequate faculty training must be implemented beforehand.

Keywords: Mini-CEX, Assessment Tool, Likert's Scale.

INTRODUCTION

The Mini-Clinical Evaluation Exercise is a workplace-based assessment of Medical Trainee both under-graduates and post graduates at wards which evaluates the trainee's knowledge, clinical skills, behaviour and attitudes.^[1]

It is an exercise which is used to assess a medical graduate's over-all clinical performance in a real-life setting and also observe the trainee's communication skills and interpersonal relationships.^[2]

The procedure aims to improve a trainee's learning performance, clinical skills along with competence when assessed by an assessor. Simultaneously the trainee gets structured feedback from the assessor.^[3]

The activity allows to know how a medical student utilizes his/her skills effectively to obtain an accurate and adequate information about patient's history and following that a logical sequence of clinical examination of the patient; ultimately arriving at a clinical diagnosis.^[4]

Each mini-CEX focuses on every aspect of a clinical encounter faced by a medical graduate and they cover: History taking, Medical Interviewing skills, Physical examination skills, Professional qualities, Counselling skills, Clinical judgement, overall Professional competence & Organisation efficiency.^[5]

It thus helps the trainees to improve their practice and identify ways of improvement regarding history taking, clinical and physical examination and professional competence.^[6]

The positives aspects of conducting Mini-CEX are they are liked by students, less irritating for patients and their relations, easy to organize, tends to be fair and immediate assessment which is then followed by a drive for improvement and change. Such changes are do reflected in the student's outlook and actions.^[7]

The viva examinations have been abandoned in many countries and replaced by mini-CEX & in USA mini-CEX are found to be valid reliable, feasible, acceptable and fair method of assessment for both under and post graduates.

Mini-CEX allows quick and fewer assessment processes to identify who are clearly competent and hence strongly recommended in assessment of medical interns in USA; also adopted as an important tool-kit of assessment of medical students in England.^[8]

Mini-CEX helps in quality control and staff development. Accordingly multiple mini-CEX performances which are generally recommended are added together for summative assessments for each medical graduates and also nursing students.^[9]

Each mini-CEX is a 15mints snap-shot and different mini-CEX should represent different clinical problems. They are to be supervised by the Clinical assessor who is usually the clinical-trainer or the educational supervisor.^[10]

AIM

To assess the acceptability of the Mini-Clinical Evaluation Exercise (mini-CEX) as a formative assessment tool among final MBBS students and faculty members.

MATERIALS & METHODS

The study was conducted in the Department of Medicine in six months duration time after having due permission from Institutional Research Committee and Institutional Ethics Committee.

It is a cross-sectional observational study

25 Final MBBS students are selected for the study from a batch of 100 students by systemic random sampling method. Students are selected after sensitizing them about mini-CEX with an audio-visual aid and informed consent was taken. Students who refused to be a part of the study were excluded. They participated in the study voluntarily and the purpose of the study was explained to them. It was explained to them the rating of this study will have no impact on their summative assessments. A mini- CEX assessment rating form was showed and distributed.

Five faculty members of assistant professor & associate professor rank of Medicine department consented to be the part of study.

Informed consent was collected from them and they too have been sensitized about mini-CEX with the similar audio-visual aid. Purpose of the study was explained to the faculty members of Department of Medicine. The faculty members acted as assessors and they evaluated the student's performance at the bedside of the patients at wards of medicine department and assessed the student's performance on the standard student's assessment form for mini-CEX which was downloaded from Basic Training Portal, available for free downloads. Each mini-CEX exercise lasted for 15 to 20 minutes.

The assessors remained by the side of the patient & the students during the whole exercise. They observed the student and assessed the student's performance which included history taking, clinical examination, clinical judgement, overall competency, communication skills & professionalism. The assessor immediately provided feedback to the trainee after the completion of exercise and rated the student's performance based on the

standard nine point scaled assessment form for mini-CEX evaluation. The shortcomings were highlighted and necessary modifications to be adopted by the students informed.

This being an initial study one student faced a single evaluation under one assessor only; ideally it is multiple exposures at regular intervals under different assessors each time. The students were provided with a feedback questionnaire regarding acceptability of mini-CEX exercise which they filled up & handed over to PI. The feedback included ten structured & validated questionnaire which student needed to answer and rating was done on Likert's scale on a scale of 1 to 5. Separate feedback forms were used for faculties and they too responded about acceptance of mini-CEX as an assessment tool based on ten structured & validated questionnaires on 5 Point Likert's scale.

Analysis of acceptability of mini-CEX was done based on the opinion provided by both students & assessors.

The questionnaire asked to students	The questionnaire asked to faculties
1. Satisfied with the encounter 2. Adequate time provided for the encounter & feedback 3. Feedback will make aware of strong & weak points 4. Conducted in a non-threatening environment 5. Determinative method of assessment 6. Induces future learning process 7. Will improve student's performance 8. Anxiety on being observed constantly 9. Will change student's attitude towards patient management. 10. Is a better method of assessment of student then conventional method	1. Satisfied with the encounter 2. Adequate time provided for the encounter and feedback 3. Feedback will make aware of strong & weak points 4. Conducted in a non-threatening environment 5. Determinative method of assessment 6. Induces future learning process 7. Will improve student's performance 8. Useful routine method in UG training 9. Will change my attitudes to future teaching 10. Is a better method of assessment of student then conventional method

The five-point Likert's scales used for analysis of these questionnaires where the participants have responded are: either strongly disagree,

disagree, neither disagree or agree (neutral), agree and strongly agree with the issues under discussion.

The numerical values for each response are:

Strongly Disagree	Disagree	neutral	agree	Strongly agree
1	2	3	4	5

Data Management

Data were entered in Microsoft Excel and analysed using descriptive statistics. Responses to the questionnaire were expressed as frequencies and percentages. To determine whether the distribution of responses differed significantly among positive, neutral, and negative categories, the Chi-square goodness-of-fit test was applied. A p-value of less than

0.05 was considered statistically significant. The results were presented in tabular form.

RESULTS

i) The questionnaire provided to students and their responses on Likert's scale:

a) Domain one: satisfaction level of students: measures overall experience

Questionnaire	Likert's Scale					Sentiment score $\pm$ SD
	Strongly disagree (%)	Disagree (%)	Neither disagree or agree (%)	Agree (%)	Strongly agree (%)	
Satisfied with the encounter	0	2 (8)	6 (24)	12 (48)	5 (20)	3.8 $\pm$ 0.86
Adequate time provided for the encounter & feedback	2 (8)	3 (12)	1 (4)	12 (48)	7 (28)	3.7 $\pm$ 1.27
Conducted in a non-threatening environment	5 (20)	4 (16)	6 (24)	3 (12)	7 (28)	3.1 $\pm$ 1.44

b) Domain two: educational value: measures learning benefit

Questionnaire	Likert's Scale					Sentiment score $\pm$ SD
	Strongly disagree (%)	Disagree (%)	Neither disagree or agree (%)	Agree (%)	Strongly agree (%)	
Feedback will make aware of strong & weak points	0	0	0	5 (20)	20 (80)	4.8 $\pm$ 0.41
Induces future learning process	3 (12)	2 (8)	5 (20)	8 (32)	7 (28)	3.5 $\pm$ 1.29
Will improve student's future performance	0	6 (24)	0	11 (44)	8 (32)	3.8 $\pm$ 1.16
Will change attitude towards patient management	1 (4)	1 (4)	3 (12)	8 (32)	12 (48)	4.1 $\pm$ 1.02

c) Domain three: assessment utility: measures usefulness as assessment toll

Questionnaire	Likert's Scale					Sentiment score $\pm$ SD
	Strongly disagree (%)	Disagree (%)	Neither disagree or agree (%)	Agree (%)	Strongly agree (%)	
Determinative method of assessment	2 (8)	2 (8)	1 (4)	8 (32)	12 (48)	4.0 $\pm$ 1.27
Is a better method of assessment of student then conventional method	3 (12)	3 (12)	2 (8)	10 (40)	7 (28)	3.6 $\pm$ 1.36

d) Domain four: perceived stress during assessment: measures psychological impact

Questionnaire	Likert's Scale					Sentiment score $\pm$ SD
	Strongly disagree (%)	Disagree (%)	Neither disagree or agree (%)	Agree (%)	Strongly agree (%)	
Anxiety on being observed constantly	8(32)	5(20)	1(4)	6(24)	5(20)	3.32 $\pm$ 1.57

e) Domains of acceptability of mini-CEX among students:

Domain	Question	Mean score	Interpretation
Satisfaction	Q 1,2,4	3.56 $\pm$ 1.19	Mildly positive
Educational value	Q 3,6,7,9	4.08 $\pm$ 0.97	Significantly positive

Assessment utility	Q 5,10	3.82±1.32	Positive
Psychological impact	Q 8	3.32±1.57	Near Neutral

f) Distribution of perception of mini-CEX among students with Chi-square analysis:

	Questionnaire	Positive n (%)	Neural n (%)	Negative n (%)	X ²	P value
1	Satisfied with the encounter	17 (68)	6` (24)	2 (8)	13.52	0.001
2	Adequate time provided for the encounter & feedback	19 (76)	1 (4)	5 (20)	18.16	<0.001
3	Feedback will make aware of strong & weak points	25 (100)	0	0	50	<0.0001
4	Conducted in a non-threatening environment	10 (40)	6 (24)	9 (36)	1.04	0.59
5	Determinative method of assessment	20 (80)	1(4)	4 (16)	20.08	<0.001
6	Induces future learning process	15 (60)	5 (20)	5 (20)	7.99	0.018
7	Will improve student's future performance	19 (76)	0	6 (24)	19.28	<0.001
8	Anxiety on being observed constantly	11 (44)	1(4)	13 (52)	10.64	0.005
9	Will change your attitude towards patient management	20 (80)	3(12)	2 (8)	19.28	<0.001
10	Is a better method of assessment of student then conventional method	17 (68)	2 (8)	6 (24)	14.96	0.0006

ii) The questionnaire provided to Faculties and their responses on Likert's scale:

	Questionnaire	Likert's Scale					Sentimen t score
		Strongly disagree (%)	Disagree (%)	Neither disagree or agree (%)	Agree (%)	Strongly agree (%)	
1	Satisfied with the encounter	0	1	2	1	1	3.40±1.14
2	Adequate time provided for the encounter & feedback	0	0	2	2	1	3.80±0.84
3	Feedback will make aware of strong & weak points	0	1	2	1	1	3.40±1.14
4	Conducted in a non-threatening environment	1	1	1	1	1	3.00±1.58
5	Determinative method of assessment	0	0	2	1	2	4.00±1.00
6	Induces future learning process	1	1	1	1	1	3.00±1.58
7	Will improve student's performance	0	0	2	2	1	3.80±0.84
8	Useful routine method in UG training	0	2	1	1	1	3.20±1.20
9	Will change my attitudes to future teaching	1	1	2	1	0	2.60±1.14

10	Is a better method of assessment of student then conventional method	2	1	1	1	1	2.67±1.63
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a) Domain wise faculty perception:

Domain	Questions	Sentiment score with SD	Interpretation
Satisfaction	Q 1,2	3.60±0.28	Positive
Educational value	Q 3,6,7,9	3.20±0.51	Mildly Positive
Assessment utility	Q 5,8, 10	3.29±0.67	Moderately positive
Psychological impact	Q 4	3.00±1.58	Neutral

b) Comparison of student & faculty perception:

Domain	Student sentiment score	Faculty sentiment score	Interpretation
Satisfaction	3.56±1.19	3.60±0.28	Both students and faculty expressed good satisfaction
Educational value	4.08±0.97	3.20±0.51	Students perceived higher educational benefit compared to faculty, particularly regarding feedback and improvement of clinical learning.
Assessment utility	3.82±1.32	3.29±0.67	Both groups agreed that mini-CEX is a useful assessment method
Psychological impact	3.32±1.57	3.00±1.58	Both are neutral regarding anxiety

The Overall Acceptability Score:

Group	Mean score ± SD	Interpretation
Students	3.70 ± 1.19	Positive perception
Faculty	3.27 ± 0.76	Mildly Positive perception

DISCUSSION

The present study evaluated the acceptability of the Mini-Clinical Evaluation Exercise (mini-CEX) as a formative assessment tool among undergraduate medical students and faculty members in the Department of Medicine. The findings demonstrate an overall positive perception towards mini-CEX, particularly regarding its educational value and usefulness as an assessment method.

Students reported a high level of satisfaction with the mini-CEX encounters, reflected by a positive mean sentiment score in the satisfaction domain. Similar findings have been reported in earlier studies where learners appreciated the structured clinical observation and immediate feedback associated with mini-CEX. The provision of direct feedback is considered one of the strongest components of the mini-CEX, enabling students to identify their strengths and areas for improvement during clinical training.

The educational value domain showed the highest mean score among students in our study, indicating that mini-CEX was perceived as beneficial in promoting reflective learning

and improving clinical performance. This observation aligns with previous studies which demonstrated that mini-CEX facilitates formative learning by encouraging active engagement between learners and assessors and promoting self-directed improvement.

Regarding assessment utility, both students and faculty members expressed a favourable perception of mini-CEX as a clinical assessment method. The ability of the mini-CEX to evaluate multiple competencies such as history taking, clinical examination, clinical reasoning, communication skills, and professionalism makes it a valuable workplace-based assessment tool in undergraduate medical education.

However, the psychological impact domain revealed relatively neutral perceptions among students and faculty members. Some students reported anxiety related to being directly observed during clinical encounters. However, anxiety will decrease with multiple exposures.

A comparison between students and faculty perceptions revealed that students generally demonstrated slightly higher acceptance scores than faculty members, particularly in the

educational value domain. Faculty members expressed relatively moderate perceptions regarding its routine implementation in comparison to conventional case presentations. Overall, the findings of this study support the growing evidence that mini-CEX is an effective formative assessment tool that enhances clinical learning, provides structured feedback, and promotes competency-based training in undergraduate medical education.

The findings of our study are consistent with international literature demonstrating the educational effectiveness and acceptability of Mini-CEX. Norcini et al. (2003),^[1] who originally developed Mini-CEX, identified direct observation and immediate feedback as its principal strengths. Similarly, Kogan et al. (2003)^[2] and Durning et al.^[3] reported that Mini-CEX promotes clinical learning, improves learner engagement, and serves as a reliable workplace-based assessment tool. In our study, students showed a positive overall perception, with the educational value domain receiving the highest score and all students acknowledging the usefulness of feedback in identifying strengths and weaknesses.

Our findings are also comparable with Indian studies evaluating Mini-CEX in undergraduate medical education. Patel et al. (2019) reported high student satisfaction and perceived improvement in clinical competence following Mini-CEX assessments in Pediatrics. Similarly, Lakshmanan et al. (2024) demonstrated that Mini-CEX was a feasible formative assessment tool that enhanced feedback, reflective learning, and student-teacher interaction in undergraduate training. Consistent with these observations, both students and faculty in our study expressed positive perceptions regarding the educational value and assessment utility of Mini-CEX, although faculty acceptance was relatively lower, possibly reflecting concerns regarding time constraints and routine implementation. The neutral perception regarding anxiety observed in our study has also been reported in previous studies and is expected to decrease with repeated exposure to the assessment process.

LIMITATIONS

- 1) The sample size was relatively small and limited to a single department in one institution.
- 2) Each student underwent only a single mini-CEX encounter, whereas multiple encounters with different assessors are

generally recommended to enhance reliability.

CONCLUSION

The present study demonstrated the acceptability of mini-CEX among students and teachers when at present at wards long and short case presentations by undergraduate students were conducted as a part of medical curriculum. It was accepted that in contrast to conventional case presentations mini-CEX is quick and offers opportunities for continuous direct observation, immediate feedback and necessary conversation with students regarding improvement of clinical competencies. With faculty training mini-CEX is destined to improve & strengthen competency based medical education.

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