

MEDICAL EDUCATION**Mini Clinical Evaluation Exercise (Mini-CEX): An overview****Sobia Ali, Nazish Fatima, Mukhtiar Baig**

Over the last two decades, medical education has changed its role significantly to move from the traditional curriculum to the outcome based education. This is done after deciding the competencies to be achieved by the students more clearly¹. The Institute for International Medical Education (IIME) has clearly focused the minimum essential core competencies that a medical graduate must possess including the clinical skills, communication skills, professional values, attitudes and behaviors¹.

To check students' minimum essential core competencies, examinations are organized at the end of the final year of medical school, which consists of written, practical and oral examinations. However, the critical question is if the assessment tools in practice are sufficiently enough to assess the competencies required for future doctor? The response leads to a need for improved performance based assessment tools for better judgment of these outcomes.

Why is there a need to change the assessment tools?

For refinement of assessment tools we should have valid arguments and the following may be considered facilitative:

Traditional long cases are being used for assessing the outcomes. It becomes hard to achieve a reliable overall judgment because it mainly relies on single observation and cannot predict the habitual performance in practice^{2,3}.

Objective structured clinical examination (OSCE) is frequently used to assess the performance and behaviors of future doctors. Along with many advantages, its drawback is that trainee's

performance is assessed in a controlled representation of practice and cannot predict the performance in the future. For a reliable judgment, student should be in certain conditions.

Objective structured clinical examination (OSCE) is frequently used to assess the performance and behaviors of future doctors. Along with many advantages, its drawback is that trainee's performance is assessed in a controlled representation of practice and cannot predict the performance in the future. For a reliable judgment, student should be in certain conditions.

A minimum of 20 stations for OSCE is recommended which is seldom followed due to logistic reasons.⁴

Similarly, the validity of the summative ratings in questionable due to indirect observation that fails to provide students with feedback regarding the improvement of their clinical skills⁵.

On the other hand, the use of formative assessment during the clinical years has a potential to direct the learning towards the outcomes by reinforcing desired learning behavior⁶.

The emphasis has been on attaining knowledge during the clerkship now also incorporates achieving skills and behaviors side by side for the attainment of integrated competence. This phenomenon also leads for a need to shift in assessment tools use to determine the outcomes of clerkship⁷.

After a thorough analysis of these aspects, educationists are now persistent that the validity of final examination would improved if it is aligned with continuous assessment during the training^{8,9}. Therefore workplace-based assessment plays a key role in aligning training and learning with assessment⁶. Hence, mini clinical evaluation exercise (Mini-CEX) appears to be a best alternative for assessment of medical graduate clinical competence and can be used for the summative purpose too.

Historical background

In 1972, the American Board of Internal medicine decided not to use oral examination as part of evaluating residents' clinical competence due to above mentioned reasons. The Board then developed and recommended clinical evaluation exercise (CEX) for a better judgment of clinical competencies.

However, then again, the objections arose that this method did not assess the students frequently, leading it to be the less relevant measure of clinical competence. The efforts were directed towards a tool that can evaluate the skills that are most often needed

✉ **Sobia Ali**

Department of Anatomy/DME, Bahria University Medical and Dental College, 13-National Stadium Road, Karachi.
Email: dralisobia@yahoo.com

Nazish Fatima, Department of Anatomy/DME, Bahria University Medical and Dental College, Karachi.

Mukhtiar Baig, Department of Biochemistry /DME, Bahria University Medical and Dental College, Karachi.

Received November 02, 2010, Revised December 10, 2010
Accepted December 20, 2010

by residents in the real patient encounter. The term mini-CEX was introduced to overcome the short comings of traditional CEX¹⁰. Mini-CEX was initially used for evaluating the internal medicine trainees. It was introduced for undergraduates in 90s, when the issues regarding the reliability of the assessment taken at the end of clerkship originated. In-training assessment has been incorporated during rotation in wards and the mini-CEX, evaluate the clerks' competence of this in-training assessment program¹¹.

In addition to the assessment of internal medicine residents, mini-CEX is used for cardiology, psychiatry, anesthesiology residents, international medical graduates and undergraduates as well^{3,5,12-15}.

Mini-CEX in undergraduate evaluation

For evaluation of undergraduates, mini-CEX comprises of a series of 30-45 minutes of observations as compared to 15 minutes for postgraduates followed by 15-20 minutes of feedbacks longer than 5 minutes for post graduates¹⁶. The observation is done by a faculty member or resident or a senior house officer and then recorded on a short evaluation form (appendix A) using a nine point scale, where 1-3 is unsatisfactory, 4-6 satisfactory and 7-9 superior. On each form, evaluators document the number of minutes spent observing the student and providing feedback, and the evaluator and student rate the satisfaction with the mini-CEX using a nine point scale (1=low and 9=high). The feedback given after observation should be interactive with the following three basic components¹⁷:

1. Discussion on every aspect, especially on what is competently performed.
2. Providing suggestions for development on lacking or poorly performed skills.
3. Agreed plans of improvement made by the student with the help of the assessor.

Competencies assessed during mini-CEX

Seven competencies that are evaluated in mini-CEX include:

1. Medical interviewing skill
2. Physical examination skill
3. Professionalism/ humanistic qualities
4. Clinical judgment
5. Counseling skill
6. Efficiency skill
7. Overall clinical competence

Validity, Reliability and Feasibility of Mini-CEX

Numbers of studies on the measurement of mini-CEX have been published and different conclusions were made based on them. Most studies conclude that mini-CEX is a valid assessment tool as its scores correlates well with written examination and other assessment methods and also by its capability of discriminating between the preexisting levels of clinical competence^{3-6,15,18-22}.

In order to declare the results of mini-CEX to be reliable, some studies suggest that 8 evaluations in a single clerkship are enough to get reliable scores from mini-CEX⁵ while others suggest that 10-11 evaluations are needed^{3,15}.

Regarding its feasibility, most researchers suggest that because it is brief and focused, it is feasible to use in both the inpatient and outpatient clinical core settings^{5,12,17,22,23}. While others argue that in order to achieve the reliability of 0.8, minimum of 8-11 evaluations' scores are required in a single clinical rotation of three months, which is not practical for the busy clinicians or residents¹⁵.

Strengths of mini-CEX

The most attractive feature of mini-CEX is that it involves direct observation of a trainee in a focused clinical encounter by an assessor that helps to identify the performance level of student^{12,18}.

Mini-CEX with its multiple encounters evaluates a student in diverse aspects of clinical settings with a variety of patient problems that help to achieve integrated whole competence²⁴.

Direct observation also helps to build a relationship between faculty and students¹⁹.

During the clerkship, the students learn to integrate theoretical knowledge with practical work. However, with supervision and feedback given during mini-CEX they refine their skills to be more competent when encountering the real patient⁴.

By the help of feedback, the information on the positive and negative aspects of students' performance is shared. This helps to identify the students' specific area to gain competency which in turn leads to better evaluation of students^{20,21,25}.

Performance of the student followed by immediate feedback also helps the student to have an insight into his own performance that is what he or she does habitually when not observed. It thus creates an ability of self assessment in students.

It helps the learner to take the onus of his own learning by generating a capacity to adopt change, find and generate new knowledge and improve overall performance and thus help the student to become deep learner^{14,15}.

The feedback given to students is from an expert of the respective field which adds credibility to assessment^{26,27}.

It has also been proven that professionalism cannot be acquired by role modeling only, because mini-CEX has professionalism as a category to assess, it helps to develop humanistic qualities in students¹⁹.

After complete evaluation of student along with proper feedback, the evaluator can consult the student's mentor to discuss the student's performance that can also help to achieve the required competence²⁴.

Last but not the least mini-CEX, shifts the paradigm of assessment to assess the student from "show level" to the "does level" of Miller's pyramid of clinical competence^{8,15}.

Weaknesses of mini-CEX

Habitual behaviors cannot be assessed by this method as the student is aware that he/she has been observed^{26,27}.

Although it is time efficient for a single evaluation but for getting a valid and reliable assessment from mini-CEX at least 8-14 observations are needed, this is quite time consuming³.

Repeated observations made for the formative purpose, may add a component of bias when the same assessor is involved in summative rating. This common rater error makes it a less reliable tool for summative testings⁵.

Even it is evaluated by credible experts, the question of inter-rater reliability still exists because it is well documented that residents are lenient raters than faculty members⁵.

Evaluators usually need training to use the form of mini-CEX, which is again a burden on the faculty as well as administration⁵.

An improper and non interactive feedback does not have any effect on performance.

A feedback in a negative manner may discourage the students, which again can cause a barrier in the way of one's learning.

Principles of assessment followed by mini-CEX

Mini-CEX has been designed in a way that it follows the modern principles of assessment as follows:

- The main purpose of formative assessment in medical education is that it should provide direction and motivation for future learning, including knowledge, skills and professionalism and mini-CEX helps to achieve these basic competencies in a self directed way.

- By repeated direct observation during the clerkship, the assessor got the chance to assess the habits of mind and behavior of the students.
- Through the help of interactive feedback, it enhances the desire to self regulate one's own performance.
- Application of the knowledge can be assessed by this method.
- Communication skills and professionalism can be assessed.
- Clinical reasoning and judgment skills in new situations can be evaluated by this method.
- Practice based learning can be assessed
- While conducting a mini-CEX evaluation in clerkship, the assessment is organized into a repeated and related developmental program of the students.
- It uses experts to make the judgment of students' performance.
- It provides timely feedback and mentoring for students in their clerkship.
- Its reproducibility is higher than traditional methods of assessment¹⁰.

Conclusion

Mini-CEX has been in practice as a formative assessment tool in West for the last three decades for post graduates and undergraduates as well. However, limited data available on the internet regarding its implication and effects in Pakistan, doesn't mean that it is a new phrase for us. In Pakistan, educationist are working on the subject; as evident from the conference presentations and publications^{28,29}. Mini-CEX has also been practiced in the pediatric neurology fellowship program at Agha Khan University Hospital (AKUH)³⁰.

Documented evidence for its practice in our country is not readily and easily accessible. However, it is not difficult to practice this comparatively newer assessment tool in our circumstances. A structured stepwise implementation plan will help educators to measure the clinical competence as well as integrated competence required for future doctors:

- The first step is to motivate the practitioners and residents for this tool, so they could struggle to combine their clinical and administrative duties with teaching responsibilities.
- Training of assessors is also an essential requirement for its effective implementation. This includes training to give feedback to students and to use the evaluation form too.
- The observations made during mini-CEX should be recorded on highly structured form so that all

the skills needed to be evaluated, can be assessed properly.

- For avoiding the common rater reliability issue, proper sampling of assessors will be an important step to be taken.
- Proper weighting to all levels of case complexities and settings should be assigned because a trainee who is assessed only on simple cases or on outpatient settings would be in disadvantage.
- Time and resources should be officially allocated for this purpose so that trainees and assessors both can enjoy the process in an organized manner.

To make it more valid it can be done in conjunction with other assessment tools such as oral case presentation, written exercises that assess the clinical reasoning and literature searches.

References

- Schwarz MR, Wojtczak A. Global minimum essential requirements: a road towards competence-oriented medical education. *Med Teach* 2002;24:125-9
- Norcini JJ. The death of long case? *BMJ* 2002;324:408-9
- Van Lohoizun MT, Kuks JBM, Van Hell EA, et al. The reliability of in-training assessment when performance improvement is taken into account. *Adv in Health Sci Educ theory pract* 2010;15:e659-69
- Hamdy H. AMEE guide supplements: Workplace-based assessment as an educational tool. Guide supplement 31.1 – Viewpoint. *Med Teach* 2009;31:59-60
- Kogan JR, Bellini LM, Shea JA. Feasibility, reliability and validity of the mini-clinical exercise (mCEX) in a medicine core clerkship. *Acad Med* 2003;78:S33-S35
- Norcini JJ, Burch V. Workplace-based assessment as an educational tool: AMEE Guide No. 31. *Med Teach* 2007;29:855–71
- Van Lohoizun MT, Kuks JBM, Van Hell EA, et al. Cohen-Schotanus J. Learning strategies during clerkships and their effects on clinical performance. *Med Teach* 2009;31:e494–e9
- Van der Vlueten C. validity of final examinations in undergraduate medical training. *BMJ* 2000;321:1217-9
- Kogan JR, Hauer KE. Brief report: Use of mini clinical evaluation exercise in internal medicine core clerkship. *J Gen Intern Med* 2006;21:501-2
- Norcini JJ, Blank LL, Arnold GK, et al. The mini-CEX (clinical evaluation exercise): A preliminary investigation. *Ann Intern Med* 1995;123:795-9
- Daelman HEM. In-training assessment in an undergraduate clerkship: Feasibility, Reliability, effect on learning environment (dissertation). VU University Amsterdam; 2005.
- Nair BR, Alexander HG, McGrath BP, et al. The mini clinical evaluation exercise (min-CEX) for assessing performance of international medical graduates. *MJA* 2008; 189:159-61
- Alves de Lima A, Henquin R, Thierer J, et al. A qualitative study of the impact on learning of the mini clinical evaluation exercise in postgraduate training. *Med Teach* 2005;27:46-52
- Alves de Lima A, Barrero C, Barata S, et al. Validity, reliability, feasibility and satisfaction of mini-clinical evaluation exercise(Mini-CEX) for cardiology residency training. *Med teach* 2007;29:785-90
- Davis MH, Ponnampereuma GH, Wall D. Workplace based assessment. In: Dent JA, Harden RM. editor. *A Practical Guide for Medical Teachers* 4th ed. London: Churchill LivingStone Elsevier;2009.p.341-48
- Fernando N, Cleland J, McKenzie H, et al. Identifying the factors that determine feedback given to undergraduate medical students following formative min-CEX assessment. *Med Educ* 2008;42:89-94
- Wilkinson J, Crossley JGM, Wragg A, et al. Implementing workplace-based assessment across the medical specialties in the United Kingdom. *Med Educ* 2008;42:364-73
- Cruess R, Mellory JH, Cruess S, et al. The professionalism mini evaluation exercise: A preliminary investigation. *Acad Med* 2006;81:S74-S78
- Holmboe ES, Huot S, Chung J, et al. Construct validity of miniclinical evaluation exercise (Mini CEX). *Acad Med* 2003;78:826-30

20. Holmboe ES, Yepes M, William F, et al. Feedback and the mini clinical evaluation exercise. *J Gen Intern Med* 2004;19:558-61
21. Kogan JR, Bellini LM, Shea JA. Implementation of Mini-CEX to evaluate medical students' clinical skills. *Acad Med* 2002;77:1156-7
22. Alves de Lima, Conde D, Aldunate L, et al. Teacher's experiences of the role and function of mini clinical evaluation exercise in post graduate training. *Int.J.Medical Education* 2010;1:68-73
23. Norcini JJ, Blank L, Duffy D, et al. The Mini-CEX: A method for assessing clinical skills. *Ann Intern Med* 2003;138:476-81
24. Cleary L. "Forward feeding" about students' progress: The case for longitudinal progressive and shared assessment of medical students. *Acad Med* 2008;83:800
25. Epstein RM. Assessment in Medical Education. *N Engl J Med* 2007;356:387-96
26. Goldstein EA, Maclaren CF, Smith S, et al. Promoting fundamental skills: a competency-based approach at University of Washington. *Acad Med* 2005;80:423-33
27. Implementing Mini-CEX as an assessment tool in undergraduates. Topic in National health Conference available at: http://www.riph.edu.pk/National_Conference/images/program%20book.pdf
28. Zaidi Z, Jaffery T, Moin S. Using positive deviance to improve students' performance. *Med Educ* 2010;44:495
29. Paediatric Neurology fellowship programme of AKUH available at: <http://www.aku.edu/pgme/fellowship-paed-neurology.shtml>