

An evaluation of the use of the mini-CEX in the foundation programme

The mini-clinical evaluation exercise (mini-CEX) is used as an assessment in the foundation programme. This article reports a study of its reliability, validity and feasibility when used by foundation trainees, and also evaluates their satisfaction with and the educational impact of the tool.

The mini-clinical evaluation exercise (mini-CEX) is one of the workplace-based assessments used to measure aspects of clinical competence in the UK foundation programme. It was introduced here in 2005. It was developed in the USA, and American studies have found it a reliable tool, with reasonable feasibility and satisfaction (Norcini et al, 1995; Norcini, 2005). However, its efficacy has yet to be evaluated in a UK setting.

The foundation programme curriculum includes a number of workplace-based assessments, deemed to test various clinical competencies (General Medical Council, 2006). One such measure is the mini-CEX. This involves a 'snapshot' assessment of the doctor's performance in an everyday clinical encounter, with feedback from a single observing assessor, looking at history taking, examination skills, communication skills, clinical judgement, professionalism, organization and efficiency and overall clinical care. Candidates must complete at least six mini-CEX assessments throughout their first year of clinical training, ideally in a variety of clinical situations and complexities, with different assessors (Norcini, 2005).

In a preliminary review, Norcini et al (1995) concluded that twelve to fourteen mini-CEX encounters were required to reach an acceptable reliability score of 0.80.

The potential of serial mini-CEXs to examine a candidate in variable situations, with different assessors, has been praised (Norcini et al, 1995, 2003). In addition,

the 1995 study showed the mini-CEX to be more reliable than the traditional United States oral bedside examination or traditional CEX. Furthermore, the 2003 study demonstrated an improvement in candidates' scores as they progressed through their training year.

Despite these advantages, the reliability, validity and contribution to training in the UK of the mini-CEX has yet to be evaluated. Questions have been raised about feedback within this assessment (Branch and Paranjape, 2002). Assessors spend more time on assessing than providing feedback and guidance (Norcini et al, 2003). Only 8% of encounters resulted in faculty providing an action plan for the student (Holmboe et al, 2004).

However, in busy hospitals in the UK, are these assessments being done to enhance learning, give good feedback and encouragement of self-reflection? Although theoretically valuable, has the mini-CEX become a 'tick-box' procedure? Is it used as the rigorous exercise that it claims to be?

This study addressed the following questions:

- Is the mini-CEX a reliable assessment tool?
- Is it fit for purpose and valid?
- Is the tool a feasible assessment method for trainees and assessors?
- Are users satisfied with the tool?
- Is the assessment undertaken and utilized in the intended spirit outlined by curriculum designers?

Method

The research project itself comprised a four-stage approach:

1. Analysis of mini-CEX scores
2. Evaluation of trainee opinion in focus groups
3. Evaluation of trainee opinion using an anonymous questionnaire
4. Evaluation of assessors' views in semi-structured interviews.

Score analysis

Mini-CEX assessments from foundation year 1 doctors were analysed at the sixth month (or halfway point) of their training. Written consent was obtained from those trainees willing to participate, and submitted assessments were coded to correspond to each submitting doctor, to ensure anonymity for the purpose of score analysis. Scores were analysed using SPSS version 15 for frequencies and descriptive statistics, and for improvement over time using regression analysis. Generalizability theory was applied using the program GENOVA version 3.1 to calculate generalizability coefficients and number of assessments required to reach acceptable reliability.

Focus groups

Following score analysis, the views of foundation year 1 trainees were obtained in focus groups. Participants were recruited on a voluntary basis. Two focus groups were run at a single hospital site. Discussion was facilitated by a single researcher (DJ) and recorded using a digital voice recorder and boundary microphone. Discussions were transcribed and analysed to identify key themes. Themes considered in focus group discussions were:

- Positive aspects of the mini-CEX
- Negative aspects of the mini-CEX
- Rationale for choosing cases or assessors
- Experience of the mini-CEX assessors
- Actual mini-CEX experience, e.g. actual observation of the task?
- Components of the mini-CEX exercise which are valuable to trainees
- Educational impact of the tool
- Overall satisfaction with the tool
- Overall usefulness of the tool.

Questionnaire

A questionnaire was designed, based on the key themes derived from the focus groups: familiarity and experience of the mini-CEX tool, trainee opinion on various

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aspects of the mini-CEX experience, and overall trainee satisfaction with the tool. There were some demographic questions and a free comments box. The questionnaire was piloted, amended and then distributed to foundation year 1 doctors by hospital education staff at both hospital sites during compulsory foundation year 1 teaching. Completion was voluntary.

Results were recorded in an Excel database and later transferred to the statistics program SPSS version 15. Quantitative analysis used descriptive statistics, Chi-squared and Kruskal–Wallis tests.

Interviews

Semi-structured interviews were carried out with two consultant assessors. One interview was recorded using a digital voice recorder. For the second interview, key themes were recorded by the facilitator immediately after the encounter. The following components of assessor experience with the mini-CEX were considered:

- Initial introduction to the mini-CEX
- Feasibility of the assessment
- Familiarity and readability of the tool
- Opinion on the scoring system
- Opinion on the feedback component
- Ability of the mini-CEX to give a realistic reflection of trainee performance
- Use of the mini-CEX in the appraisal process
- Educational impact.

Analysis of text and comments

Data from the focus groups, the interviews and the free-text comments from the questionnaire were analysed using thematic analysis (content analysis), with concept and coding techniques (Coffey and Atkinson, 1996; Cohen et al, 2007).

Results

A total of 47 foundation year one trainees voluntarily submitted their mini-CEX assessments, with a total of 196 mini-CEXs available for analysis. Eight trainees participated in focus groups, with one group of three and another of five trainees, and 37 anonymous questionnaires were returned by trainees. Two consultant physicians were interviewed.

Validity analysis

Validity of the tool was determined by its ability to demonstrate improvement in

trainee performance with time. For critical judgement and organization, regression analysis showed that scores increased significantly over time, with *P* values of 0.016 and 0.014 respectively, suggesting significant trainee improvement with time in both these areas. These were no significant changes in other domains assessed using the mini-CEX.

Score analysis and discrimination

Of the 196 assessments, only one resulted in an overall grade that was ‘below expectations for foundation year 1 completion’, with a second assessment deemed ‘borderline’. All remaining assessments stated that the student was meeting or above standards for foundation year 1 completion.

Of assessors 58% were specialist registrars, with senior house officers providing 20% and consultants 12% of assessments.

Reliability analysis: generalizability theory D (decision) study

Using data from 45 people all with three mini-CEX assessments each, eight mini-CEX assessments per person are required to achieve acceptable reliability with a generalizability coefficient of 0.8. Six assessments (the current annual requirement) produced a *G* coefficient of 0.75 (Table 1).

Number of mini-CEX assessments	Generalizability coefficient
3	0.60839
4	0.67442
5	0.72139
6	0.75652
7	0.78378
8	0.80556
9	0.82334
10	0.83815
11	0.85067
12	0.86139

CEX = clinical evaluation exercise

Feasibility and satisfaction analysis

Thematic analysis of questionnaire responses is outlined in Table 2. Key themes from discussion and survey findings are summarized below:

Potential for education and assessment recognized

The potential benefit of the tool to assess the trainee across various clinical aspects was acknowledged by trainees and assessors. Assessors found the structure useful, and trainees valued the interaction with a senior doctor to receive feedback on performance.

Direct observation poor

Direct observation of trainee performance is frequently not done by the assessor: 37.8% of trainees were rarely or never observed doing a mini-CEX (Figure 1).

Pre-arranged encounters preferred

Both assessors preferred pre-arranged mini-CEX encounters in contrast to the ad-hoc, day-to-day assessments proposed. However, most trainees (59.5%) found encounters difficult to arrange, because of time pressures, finding senior doctors, and a feeling of imposing on assessors.

Unrealistic insight into trainee performance

Assessors thought that the mini-CEX did not provide a realistic insight into trainee performance, but that it could identify poor performers. Most trainees (70.3%) also thought the mini-CEX was an unrealistic reflection of their performance.

Lack of faculty engagement and expertise

Trainees said they had to ‘beg’ for an assessment, and described begrudging assessors, unfamiliar with the tool – 59.9% of trainees felt that the assessors did not know what they were doing during a mini-CEX encounter. Thematic analysis of free-text comments suggested that it was largely older consultants who were less familiar with the assessment process.

Trainee dissatisfaction with feedback

Assessors felt happy with feedback, in contrast to the trainees’ opinions: 27% of trainees had ‘rarely’ or ‘never’ received feedback on their performance, with only

around one quarter (26%) viewing the tool as a useful means of gaining feedback (Figure 2). Thematic analysis, however, suggested that feedback, when given, was seen by trainees as the most important component of the assessment. There was no evidence of written feedback relating to 'agreed action' between the trainee and assessor for future learning in 53% of assessments.

Ill-defined and over-complicated scoring

Assessors found the 6-point scoring ill-defined, and suggested a simpler approach, such as 'needs improvement', 'meets expecta-

tion' and 'above expectation'. Trainees had little interest in scores, as long as they passed. They preferred a 'pass' or 'fail' scoring system. Trainees thought that feedback, when given, was of significantly more value than the score awarded.

Tool tends not to motivate a change in practice

There was a distinct lack of ability to motivate or change practice. Trainees viewed the tool as a tick box exercise, particularly in circumstances of poor assessor engagement. Only 10.8% of trainees had adapted their clinical approach as a result of the

mini-CEX, and 56.8% felt that the tool did not motivate them to improve.

Poor trainee satisfaction

Mean trainee satisfaction with the mini-CEX experience was poor, at 3.87 (using a 1–10 scale, with 1= 'not satisfied at all' and 10= 'extremely satisfied') (Figure 3).

Lack of training in use of the tool

Assessor discussion revealed lack of training in use of the tool. One assessor had never received any form of training and was unaware of training resources. The second had only seen a brief demonstration of a mini-CEX assessment. Neither had received training in the scoring process.

Discussion

The mini-CEX scores were reliable, with only eight encounters required to reach a G coefficient above 0.8. Foundation programme guidelines currently require a minimum of six submitted mini-CEXs, so an additional two assessments would appear to be a relatively feasible task.

For validity, improvement with time was seen in the areas of critical judgement and organization. These areas of clinical practice are those in which trainees are least familiar on commencement of their post, and it was encouraging to demonstrate an improvement in these areas during the first 6 months of training. In addition, trainees and assessors alike acknowledged the potential of the tool, with its ability to engineer an interaction between teacher and learner, and act as a platform for feedback, discussion and learning.

Figure 1. Frequency of observation of mini-CEX (clinical evaluation exercise) assessments.

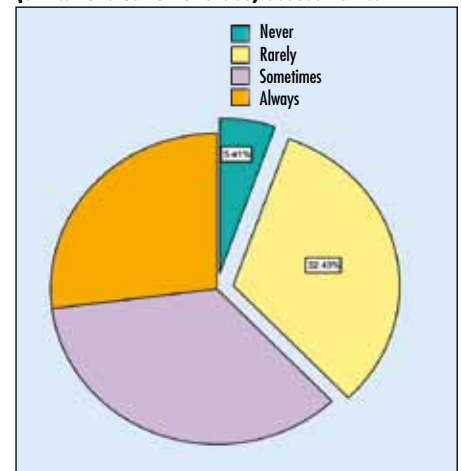


Table 2. Thematic analysis of concepts identified in questionnaire comments and focus group discussion		
Themes from questionnaire free-text comments and focus groups		Frequency of theme
The tool itself	Overlap with the case-based discussion tool	6
	Reliability questioned	3
	Variability of trainee performance	1
	Uncertainty of number of cases required	4
	Differing standards	3
	Scoring: Should there only be two categories? (change scoring rating)	2
	It is a comprehensive assessment	4
	Validity questioned	8
	Mini-CEX assessment episode	
	Time pressure in some jobs	4
	The need for dedicated assessment time	5
	Senior doctors preferred as assessors	4
	Team members as assessors	1
	Imposing on the assessors	8
	More difficult to find assessors in medicine than surgery (and converse of this statement)	1
	Mini-CEX assessment not observed	4
	Assessors	Lack of assessor training
Training the assessors helps		1
Unfamiliarity with the form		4
Should the assessors choose the cases?		2
Variability of assessors		5
Older consultants not so good with it		4
Guidance	Guidance on mini-CEX requirements varies	5
Educational impact	Feedback, when received, is the most important thing	3
	When you get loads of feedback, it's great	5
	Encourages good practice	1
	No educational impact/tick box exercise	9

CEX = clinical evaluation exercise

With this demonstration of good reliability, it is extremely interesting to discover poor rates of direct observation in the mini-CEX encounter. Either the tool is an extremely robust measure of trainee competence, or there is a suggestion that these reliability figures should be treated with caution.

With regards to utility of the mini-CEX, its purpose must be considered. While some assessments demand impressive reliability figures, others attach more signifi-

cant value to areas such as educational impact or feasibility. With only one 'below standard' grade in almost 200 assessments, the results from this study suggest that the tool has a more formative purpose. Through mini-CEX encounters and feedback, trainees should have weaker areas identified, so they can adapt their learning and methods to improve. As feedback is the 'heart of medical education' (Holmboe et al, 2004), is feedback being given by assessors? On review, it appears that feed-

back, in general, is poor. Almost one third of trainees had rarely or never received feedback from assessors, and only around one-tenth made a change to their practice as a result of a mini-CEX encounter. With regards to the quality of feedback, analysis of free-text comments on mini-CEX documentation show vague comments including 'continue' or 'read more'. Problems were most evident in feedback relating to 'agreed action' for future learning, with assessors of the specialist registrar grade more often than not providing no feedback or poor quality feedback in this area.

Feasibility has also been criticized. Despite being designed for everyday 'real life' clinical situations, assessors have confessed to rejecting this process in favour of more feasible, 'pre-arranged' encounters. Even with this adaptation, almost two-thirds of trainees find the assessment difficult to arrange. Trainee discussion paints a picture of begging trainees, pleading for a moment of time with a begrudging assessor.

The study has therefore demonstrated evidence of disgruntled trainee opinion as to the feasibility and educational impact of the mini-CEX. This is reflected in poor satisfaction scores, with an average score of less than 4 out of 10.

In this study, the mini-CEX tool does not appear to demonstrate a discriminatory purpose and it did not demonstrate validity across all domains. Trainees state that many mini-CEX assessments are completed without direct observation, and this potentially invalidates the process. Further study is needed to determine whether the demonstrated weaknesses are as a result of problems with the implementation of the mini-CEX, or if they are related to inherent weaknesses in the tool itself.

Assessors feel that the tool's design allows for the detection of poorly performing trainees; however, over 70% of trainees felt that the assessment did not provide a realistic insight into their performance. There was no evidence that the one trainee who was detected as having performed poorly was given feedback or an action plan as a result. This clearly raises questions as to the assessment's ability to provide a robust means of detection and management of poorly performing trainees. It would be useful to compare the scores of trainees in the other foundation programme workplace-based assessments to explore this further.

Figure 2. Trainee opinion on feedback.

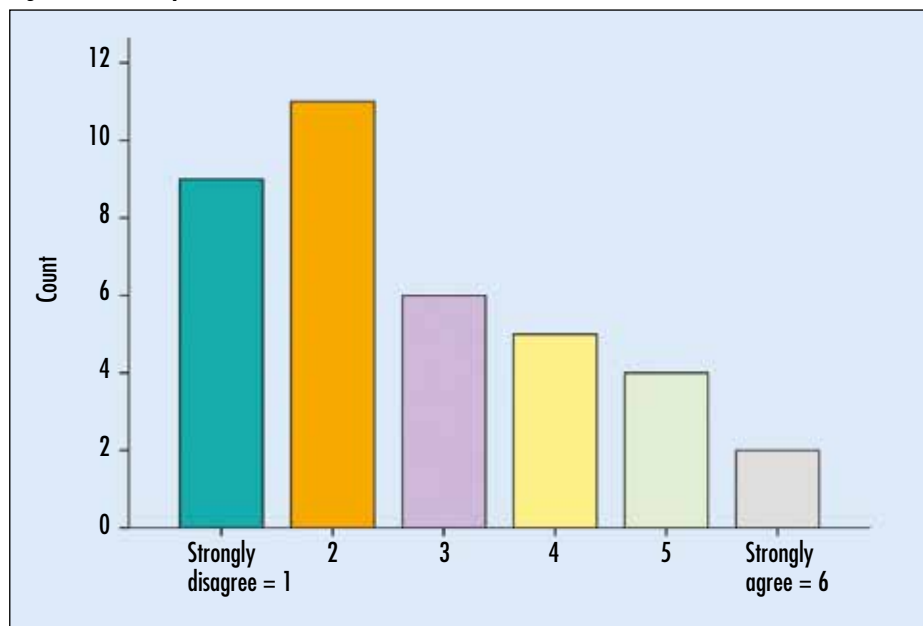
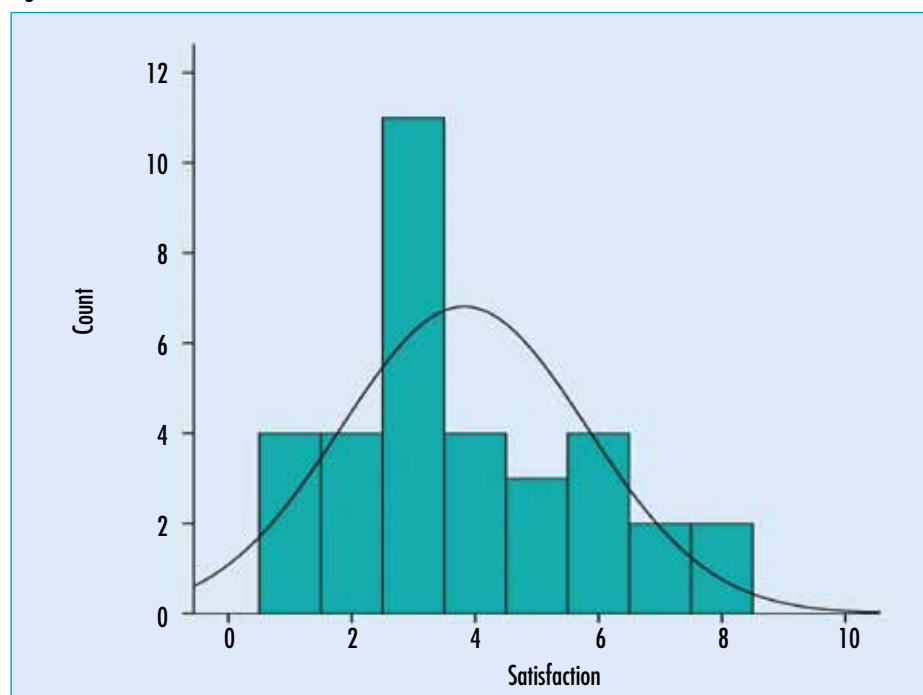


Figure 3. Trainee satisfaction scores.



Particularly evident in this study is that training in the tool appears variable. Almost 60% of trainee respondents felt that assessors were unfamiliar with the mini-CEX tool. The study has demonstrated that specialist registrars provide the majority of mini-CEX assessment, and further training should therefore aim to capture this grade.

Training could address methods to improve the feasibility of observed encounters, such as encouraging the trainee to review patients on the ward round under supervision. Feasibility may also be enhanced by a simpler scoring system. Trainees felt that feedback was the area which was most valuable, but also most lacking, in their mini-CEX experience. It appears from the study that many assessors are not routinely discussing specific, goal-

orientated action plans. By providing guidance on feedback within training, this aspect of the process could be greatly improved.

Further research on consistency of mini-CEX reliability scores, on feedback, and trainee dissatisfaction is needed. In particular, research should aim to provide greater insight into a wider range of assessor opinion, across a variety of grades. A lack of training has appeared to be a key factor within this study of a single hospital site. Study across sites with variable levels of assessor training would therefore be valuable.

Conclusions

Score analysis demonstrates excellent reliability figures. However, trainee dissatisfaction, a lack of faculty engagement and poor

rates of feedback appear to run contrary to these findings. Results suggest that further research and change is needed to ensure the mini-CEX fulfils its educational role. In particular, training of assessors may be the key to improving the mini-CEX experience for trainees. **BJHM**

Conflict of interest: Dr D Jackson was a foundation year one trainee at the time data was collected for this research. Data were collected from foundation year 1 colleagues at her training hospital.

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KEY POINTS

- The mini-CEX (clinical evaluation exercise) is a relatively reliable and feasible tool, with good satisfaction rates in users. Designed as a workplace assessment tool, it has a role in education.
- A previous American study has shown the quality of feedback in the mini-CEX to be poor.
- The tool remains reliable in a UK setting, but a significant proportion of UK trainees are dissatisfied with the mini-CEX.
- Direct observation and feedback in mini-CEX assessments are particularly neglected and dissatisfaction centres around a lack of faculty engagement.
- Further research is required to ensure this tool is fit for purpose, and that assessor training reflects this.