

Investigating the Correlations of Self and Supervisors' Assessments of Ambulatory Care Skills with the Mini-CEX Among the Japanese Young Physicians in the Ambulatory Care Training

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Abstract

Background: Although many medical issues are handled in the ambulatory care setting, proper ambulatory care training is still scarce. The mini-CEX is widely used as a clinical assessment tool. However, there is little evidence on the usage of the mini-CEX in ambulatory care training. This study aimed to investigate the relationship among self-assessments, among supervisors' assessments, and between self and supervisors' assessments with the mini-CEX.

Methods: Participants were 41 first-year graduate trainees who were undergoing ambulatory care rotation. Participants' ambulatory care skills were assessed using mini-CEX both by themselves and their supervisors at the beginning and at the end of the training. Correlations among self-assessments, among supervisors' assessments, and between self-assessment and supervisors' assessment of ambulatory care skill scores were analyzed. Factor analysis for both self-assessment and supervisors' assessment scores was also performed.

Results: All skills statistically significantly improved after the three-month training shown by supervisors' assessment. High and statistically significant correlations were verified among self-assessment scores and among supervisors' assessment scores of ambulatory care skills, with correlation coefficients of 0.43-0.79 and 0.46-0.90, respectively. Factor analysis found that only one domain (overall skill) explained the other domains. There were fair to non-significant correlations between self-assessment and supervisors' assessment of ambulatory care skills.

Conclusions: The mini-CEX may not differentiate specific ambulatory care skills. It is best to prepare for both self-reflection and supervisors' assessment, especially for formative assessment in the development of a curriculum to enhance learning when using the mini-CEX for ambulatory care training.

Keywords: Ambulatory care skills; Ambulatory care training; Mini-CEX; Self-assessment; Supervisors' assessment

Introduction

Ambulatory care training is a critical area of medical education, as many of the health concerns and medical issues are handled in the ambulatory care setting [1,2]. Educational programs should, therefore, give special attention to ambulatory care in order to train physicians appropriately to deal with such issues and meet patients' needs [3]. In Japan, mandatory graduate medical training emphasizes the acquisition

of ambulatory care skills [4]. In view of such relevance, several studies conducted worldwide have emphasized the promotion of ambulatory care training at both undergraduate and graduate levels [5-8].

A medical education curriculum should consider educational needs, objectives, goals, and assessment [9,10]. In particular, the validity and reliability of the tool used to assess the training program is critical, as it is the guide for trainees and faculty to ensure the achievement of the training goal. Among the most widely used assessment tools in medical training programs, the mini-clinical evaluation exercise (mini-CEX) stands out because of its concise and practical form [11-13]. However, the validity of the mini-CEX has been a controversial issue [14,15], as there is evidence that the tool may not differentiate well the skills of each domain and lacks construct validity [16,17]. Trainees' reflection in conjunction with an objective assessment by supervisors using tools such as the mini-CEX assessment is highly recommended during training to help identify trainees' strengths and weaknesses [18]. However, educational research in ambulatory care settings using the mini-CEX is still scarce. In addition, there is currently little evidence for investigating the roles of self-assessment and supervisors' assessment using mini-CEX in ambulatory care training.

To address the abovementioned gap in knowledge, this study aimed to investigate the relationship among self-assessment, among supervisors' assessment, and between the self-assessment and supervisors' assessment using the mini-CEX among the trainees who were expected to gain skills through specific training in an ambulatory care setting. The results of this study are expected to assist in preparation for appropriate assessment planning as part of the ambulatory care training curriculum.

Methods

This study was conducted from June 2013 to March 2015 at the Department of General Medicine at the National Defense Medical College (NDMC) Hospital, Japan. The study site served for the primary care medical needs of the neighboring community while holding a tertiary care function. The Department has also played a key role in ambulatory care training for both undergraduate and graduate trainees at the hospital.

Each of the trainees who underwent the ambulatory care training during the study period was asked to participate in the study after the study objectives, process, and potential scientific impact were explained. Totaled 41 trainees rotated for the ambulatory care training and all agreed to participate in the study. The primary investigator obtained written informed consent from all participants and explained to them that participation in the study was voluntary and that they were free to leave at any time. Participants in this study, therefore, were 41 first-year graduate trainees at the Department of General Medicine at the National Defense Medical College (NDMC) Hospital who were undergoing ambulatory care rotation. The study was approved by the ethical committee of NDMC, Tokorozawa, Saitama, Japan (ID 1144 in fiscal year 2013 and ID 2026 in fiscal year 2014).

All trainees underwent the same undergraduate ambulatory care training as one of the required clinical clerkships at the department prior to the graduate training. After graduation, participants underwent 12 to 24 half-day office sessions (once or twice a week) during the three-month rotation of the training. All cases in which the trainees worked during training were supervised and precepted by at least one faculty physician. Faculty physicians, board-certified either in internal medicine or in primary care, had more than three years of teaching experience. All faculty physicians attended a weekly ambulatory care conference to standardize their teaching quality as well as the skill assessment using mini-CEX.

The faculty who precepted the case assessed the participants' ambulatory care skills at the beginning and at the end of the training using the mini-CEX. Four cases of assessment per trainee – two at the beginning and two at the end of the training program – were used to analyze trainees' ambulatory care skills. The skills assessed included history-taking, physical examination, humanistic qualities/professionalism, clinical judgment, counseling, organization/efficiency, and overall skill. Each of the skills in the mini-CEX was scored on a nine-point Likert scale, with "1" being the lowest score and "9" being the highest score. The mini-CEX assessment scale sheet also provided information for the faculty with the following scaling criteria as guidance for independent assessment: 1 to 3 was "unsatisfactory," 4 to 6 was "satisfactory," and 7 to 9 was "superior" in addition to the rubric for each skill scale for mini-CEX. The training goal was to reach a satisfactory or superior level (score 4 or higher). Since the assessment was performed to provide formative feedback by supervisors, the minimum cutoff score of the skill was not set for the summative purpose. Study participants were also asked to self-assess their ambulatory care skills in part of the mini-CEX domains (history-taking, physical examination, clinical judgment, counseling, and overall skill). The humanistic qualities/professionalism and organization/efficiency domains were excluded because, after the discussion during the conference, the faculty who participated in the study considered them difficult to be self-assessed by trainees. As with the supervisors' assessment guidance, each of the skills self-assessed by the trainees was scored on a nine-point Likert scale, with "1" being the lowest score and "9" being the highest score.

Descriptive statistics were used to describe the participant characteristics (means, median, standard deviation (SD) and error, etc.) and descriptive analysis was conducted for each score of the ambulatory care skills assessed, both for the trainees' self-assessment and the supervisors' assessment. Here, the score for improvement in all ambulatory skills were analyzed by comparing the averaged supervisors' assessment scores from the two cases at the beginning and end of the training using a two-tailed Wilcoxon signed-rank test. Correlation analyses were performed to evaluate the relationship among ambulatory care skills within the trainees' averaged self-assessment scores and averaged supervisors' scores at the end of the training. Correlation analyses between the trainees' averaged score and supervisors' averaged score at the end of the training were also performed using Pearson's correlation to determine the correlation

coefficient (r). To investigate whether any skills represented others, factor analyses for both self-assessment and supervisors' assessment scores were performed. P -values less than 0.05 were considered statistically significant. The analyses were conducted using the statistical software IBM SPSS Statistics Version 22.0 (Armonk, NY).

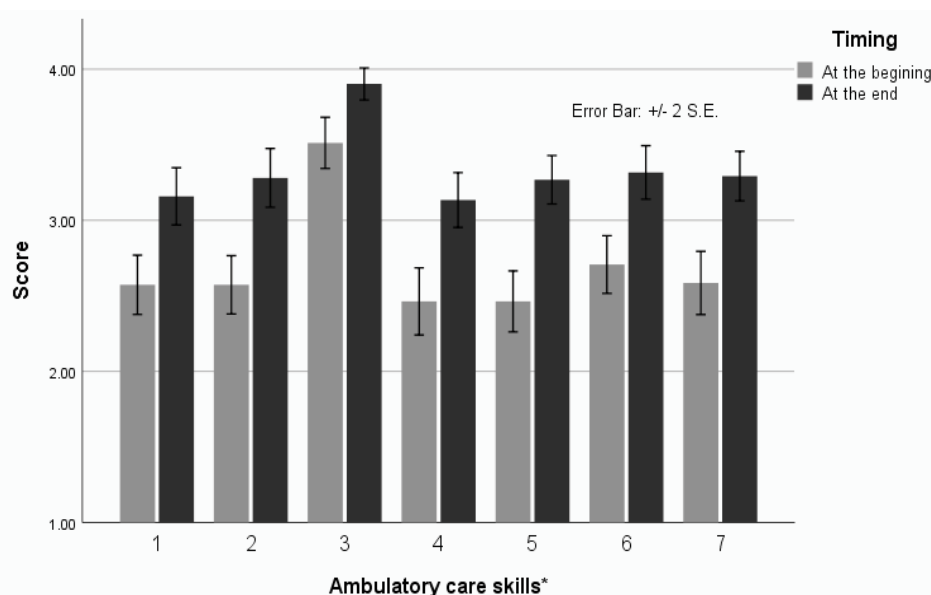
Results

All 41 first-year graduate trainees recruited with no loss agreed to participate in the study. As for gender, 31 were men and 10 were women. The age of the participants ranged between 24 and 27 years. All participants (100%) were graduates from NDMC who had exactly the same undergraduate training at the Department of General Medicine, including ambulatory care rotation. There were no missing assessments in either the self-assessment or the supervisors' assessment. The average number of cases in which the participants worked during the training (standard deviation) was 49.2 (26.4).

There were statistically significant ($P < .05$) positive changes in all ambulatory care skills (Figure 1). Scores (SDs) of ambulatory care skills improved through the training in history-taking (from 2.57 (0.63) to 3.15 (0.61)), physical examination (from 2.57 (0.62) to 3.28 (0.62)), humanistic qualities/professionalism (from 3.51 (0.54) to 3.90 (0.34)), clinical judgment (from 2.46 (0.71) to 3.13 (0.58)), counseling (from 2.46 (0.65) to 3.26 (0.51)), organization/efficiency (from 2.70 (0.61) to 3.31 (0.57)), and overall skill (from 2.58 (0.67) to 3.29 (0.52)).

The correlation analysis showed a significantly high and positive association among all mini-CEX domains of ambulatory care skills both in the self-assessment scores and in the supervisors' assessment scores (Tables 1 and 2). Pearson's correlation coefficients varied from $r = 0.46$ (physical examination and counseling) to $r = 0.90$ (organization/efficiency and overall skill) among the supervisors' assessment and from $r = 0.35$ (physical examination and counseling) to $r = 0.79$ (physical examination and overall skill) among self-assessment.

The correlation analysis between self-assessment scores and supervisors' assessment scores revealed varied results. Significant and positive correlation was found in the mini-CEX domains of clinical judgment, counseling, and overall skill ($r = 0.42, 0.42, \text{ and } 0.48$, respectively; all $P_s < 0.05$). Correlations in the domains of history-taking ($r = 0.17, p = 0.29$) and physical examination ($r = 0.21, p = 0.19$) between self-assessment and supervisors' assessment were found to be non-significant.



*Ambulatory care skills from 1 to 7 represent history-taking, physical examination, humanistic qualities/professionalism, clinical judgment, counseling, organization/efficiency, and overall skill, respectively.

Figure 1: Improvements in ambulatory care skills assessed by supervisors using mini-CEX.

Table 1: Correlation analysis among the ambulatory care skill scores by trainees' self-assessment.

	History-taking	Physical examination	Clinical judgment	Counseling	Overall skill
History-taking	1.0				
Physical examination	0.65‡	1.0			
Clinical judgment	0.66‡	0.64‡	1.0		
Counseling	0.53‡	0.35†	0.43†	1.0	
Overall skill	0.64‡	0.79‡	0.75‡	0.53‡	1.0

†; $p < .05$, ‡; $p < .001$

Table 2: Correlation analysis among the ambulatory care skill scores by supervisors' assessment.

	History-taking	Physical examination	Humanistic qualities/ professionalism	Clinical judgment	Counseling	Organization/ efficiency	Overall skill
History-taking	1.0						
Physical examination	0.51‡	1.0					
Humanistic qualities/ professionalism	0.50‡	0.58‡	1.0				
Clinical judgment	0.75‡	0.69‡	0.54‡	1.0			
Counseling	0.62‡	0.46‡	0.51‡	0.63‡	1.0		
Organization/efficiency	0.80‡	0.63‡	0.49‡	0.82‡	0.69‡	1.0	
Overall skill	0.76‡	0.70‡	0.55‡	0.89‡	0.72‡	0.90‡	1.0

‡; $p < .001$

Table 3: Factor analysis of the self-assessment scores.

	Self-assessment
Overall skill	0.911
Clinical judgment	0.846
Physical examination	0.787
History-taking	0.755
Counseling	0.576

Table 4: Factor analysis of the supervisors' assessment scores.

	Supervisors' assessment
Overall skill	0.974
Organization/efficiency	0.920
Clinical judgment	0.913
History-taking	0.800
Counseling	0.735
Physical examination	0.714
Humanistic qualities/professionalism	0.580

Overall skill represented all other ambulatory care skills shown by the factor analysis, both for self-assessment and for supervisors' assessment. Overall skill self-assessed and assessed by supervisors explained 70.9 % and 67.8% of the variance of the other skills, respectively. Factor loading and component analysis for both self-assessment and supervisors' assessment are shown in Tables 3 and 4.

Discussion

Our study found that all the trainees' ambulatory care skills assessed significantly improved after the three-month training program. Several studies reported the improvement of medical knowledge and/or perceived skills after training programs [8,19,20]. However, no improvements in skills or medical knowledge have been reported among trainees [21,22]. Such an inconsistent outcome is probably due to the varied training programs among the studies. However, as pointed by Kogan et al [11], skill improvements are rare and further research is needed to assure the effect of training as an outcome in the field of ambulatory care training. The findings of this study reveal that a structured ambulatory care training increase the trainees' skills, and well-designed training should be provided to young physicians as postgraduate training, since most of health care is being handled in the ambulatory care setting. This study significantly gains scientific

knowledge in ambulatory care training as it is the first to investigate the role of self and supervisors' assessment using mini-CEX specific to the ambulatory care setting in a prospectively followed cohort.

Statistically significant high correlation among the ambulatory care skills both within self-assessment and supervisors' assessment may imply that the mini-CEX do not reveals specific strengths and weakness of ambulatory care skills. In addition, the findings of the factor analysis indicated that only one skill (the mini-CEX domain of overall skill) explained most of the variability of the other skills. Our findings support the results of previous studies, concluding that neither trainees nor supervisors assess different skills separately [16,23,24]. Thus, it is reasonable to prepare for another tool in conjunction with the mini-CEX to complement validity when carrying out assessment in the curriculum to reveal the strength and weakness of the specific skills. Using multiple assessments also may help supervisors to provide specific feedback to increase the skills, too. The results showing that the mini-CEX have a limitation in detecting strengths and weaknesses in its clinical skill domains further extend the evidence in a different setting.

This study also verified a low and non-significant correlation between self-assessment and supervisors' assessment in some skill domains of the mini-CEX (history-taking and physical examination). The finding that the results of self-assessment differed from those of supervisors' assessment of ambulatory care skills support the previous literature. Berendonk et al. studied the correlation between mini-CEX scores among undergraduate medical students, verifying a correlation moderate to fair (correlation coefficient 0.29 to 0.51) [14]. The trainees and supervisors potentially assess the distinct dimensions of clinical skills in the domains of mini-CEX, at least in history-taking and physical examination.

Self-assessment promotes self-reflection and is reported to help trainees identify their strengths and weaknesses [25]. Formative assessment by supervisors with feedback may play key roles in enhancing learning, which has been shown to be a positive educational impact [26,27]. Supervisors' assessments using the mini-CEX were also valuable to improve clinical skills [28,29]. Thus, considering the different constructs revealed by self and supervisors' assessment and the value of the two assessments, it seems ideal to prepare for both self-assessment and supervisors' assessment when using mini-CEX. This applies especially for formative assessment in the development of a curriculum of ambulatory care training.

This study has several strengths and limitations. The training period was relatively long, which allowed us to assess the improvement in each ambulatory care skill prospectively. A relatively long period of ambulatory care training allowed us to understand the analysis in the context of a practical training environment. In addition, the study participants had a relatively homogeneous demographic background, which provided high internal validity. The study participants underwent exactly the same undergraduate medical curriculum at the same medical school and no study participants were from other medical schools. Supervisors had exactly the same faculty training where the study goals, procedures, and assessment guide were taught before the assessment. One of the limitations in the study was subjective nature in measurement. Objective assessment such as OSCE rather than a single supervisor's assessment may supplement further analyses on the correlation between self-assessment and supervisors' assessment. On the other hand, a major drawback was the results from study participants in a single program lacking generalizability. It is of great research interest to conduct the study involving multiple sites to increase the external validity.

Conclusions

While the mini-CEX is a useful and practical assessment tool, it may not differentiate specific ambulatory care skills. Thus, other tools should be used in conjunction with the mini-CEX. Furthermore, it is best to prepare for both self-reflection and supervisors' assessment, especially for formative assessment in the development of a curriculum to enhance learning when using the mini-CEX for ambulatory care training.

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