

# Professional Development is Enhanced by Serving as a Mini-CEX Preceptor

WALTER CHEN, MD, MS; MING-MAY LAI, MD; TSAI-CHUNG LI, PHD; PAUL J. CHEN, MD, PHD; CHO-YU CHAN, MD; CHENG-CHIEH LIN, MD, PHD

**Introduction:** The mini-clinical evaluation exercise (mini-CEX) is widely used for the evaluation of medical trainees' clinical competence. To our knowledge, no study has examined the effect of mini-CEX on the preceptors. Based on the principle of "to teach is to learn twice," we hypothesized that the act of precepting a mini-CEX would enhance preceptors' own learning and performance.

**Methods:** A 21-item questionnaire incorporating the 3 out of 4 levels of Kirkpatrick's model was completed by experienced mini-CEX preceptors. Data collected from the questionnaire included ratings of Kirkpatrick's level of "Reaction" (level 1) and "Behavior" (level 3) and the frequencies of relearning the clinical skills related to mini-CEX, which assessed Kirkpatrick's "Learning" (level 2).

**Results:** A majority of the respondents either strongly agreed or agreed that precepting the mini-CEX both increased reflection on their own clinical practice and had a positive impact on their clinical skills. More than 80% of preceptors reported relearning one or more of the mini-CEX clinical skills. Experienced preceptors relearned the clinical skills more frequently than the less experienced preceptors. About one-third of respondents indicated that being a preceptor of mini-CEX increased both self-confidence and health care quality in their own clinical practice.

**Discussion:** These findings provide preliminary evidence suggesting that participating as a preceptor in a mini-CEX has a positive impact on the preceptor's professional development. Further studies are needed, including analyzing mechanisms of mini-CEX on the clinical skills of preceptor, and assessing whether similar effects can be observed in other teaching hospitals in different cultural contexts.

**Key Words:** mini-clinical evaluation exercise (mini-CEX), faculty development, professional development, continuing medical education, Kirkpatrick's model, Taiwan

## Introduction

The mini-clinical evaluation exercise (mini-CEX) is a short, structured clinical assessment developed by the American Board of Internal Medicine (ABIM). A trainee's clinical performance across 7 domains (medical interviewing, physical examination, humanistic qualities/professionalism, clinical

judgment, counseling, organization/efficiency, and overall clinical competence) is observed by an experienced preceptor during an interaction with a real patient. The preceptor, usually the attending physician or resident caring for the patient, makes an assessment and provides immediate feedback to the trainee. The original goal of the mini-CEX was to evaluate and improve the clinical competence of the trainee being evaluated; however, the true end point is to improve the quality of patient care. In the past decade, it has been shown that the mini-CEX is feasible, reliable, valid, and correlates well with other standardized measures of clinical competence.<sup>1-6</sup> However, most of the studies have focused on the impact on trainees, such as residents and medical students, and there is little information in the medical education literature regarding the impact of the mini-CEX exercise on the preceptors themselves.

The concept of learning from teaching is not new. The dictum attributed to Seneca (5 BC–65 AD)—*Homines dum docent, discunt*—can be loosely translated as "the best way to learn is to teach." The American Medical Association awards continuing education credit for some teaching activities.<sup>7</sup> In our view, learning from teaching should be counted among the core principles of continuing medical education. There

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*Dr. Chen:* Professor, School of Medicine, China Medical University, and Department of Pediatrics, China Medical University Beigang Hospital; *Dr. Lai:* Department of Family Medicine, China Medical University Hospital; *Dr. Li:* Professor, Graduate Institute of Biostatistics, China Medical University; *Dr. Chen:* Assistant Professor, Department of Biotechnology, Asia University; *Dr. Chan:* Associate Professor, School of Medicine, China Medical University, and Department of Internal Medicine, China Medical University Hospital; *Dr. Lin:* Professor, School of Medicine, China Medical University, and Department of Biotechnology, Asia University.

*Correspondence:* Prof. Walter Chen, 91 Hsueh-shih Road, Taichung 40402, Taiwan; e-mail: chenwalt@yahoo.com.

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is some evidence in the health care literature regarding the educational value of teaching to the teacher. General practitioners who taught clinical skills reported increased morale, improved quality of clinical practice, and positive practice changes.<sup>8,9</sup> Improvements in clinical skills were the result of increased reflection and reading, receiving challenging questions from students, and increased time with patients. The early literature on “resident-as-teacher” programs reported that many residents believe that teaching improved their clinical knowledge and skills and promoted their further efforts as self-directed learners.<sup>10,11</sup> A subsequent study of pediatric residents yielded similar results.<sup>12</sup> In light of these findings we hypothesized that serving as a mini-CEX preceptor would stimulate reflection and self-directed learning, and might change professional behavior.

To explore this hypothesis, we conducted an evaluation to determine whether serving as a preceptor for a mini-CEX has a positive impact on the preceptors’ own learning and performance. We used Kirkpatrick’s Model as a conceptual framework; this model includes four levels of outcomes for evaluating training programs: “Reaction,” “Learning,” “Behavior,” and “Results.”<sup>13,14</sup> TABLE 1 summarizes these 4 levels using Kirkpatrick’s original descriptions.<sup>13</sup> Although the mini-CEX is not intended to be a training exercise for the preceptor, the Kirkpatrick model frequently has been used in systematic reviews of the impact of faculty development programs.<sup>15,16</sup>

The purposes of this study were 3-fold: (1) to assess the impact of the mini-CEX on the preceptor’s professional development; (2) to identify which of the general clinical skills evaluated by the mini-CEX are relearned by the preceptor and determine the frequency of relearning; and (3) to evaluate the changes in the preceptor’s self-confidence and self-reported health care quality after the mini-CEX encounter. For the

purpose of this study, “relearning” was operationalized as going back to textbooks for clarifications or medical journals for updates on current recommendations. Although there are actions other than consulting textbooks or journals that might serve as evidence of relearning or self-directed learning, consulting textbooks or journals is a highly concrete and specific behavior and, we presumed, more easily remembered.

## Methods

In 2004–2005, the School of Medicine at China Medical University introduced the mini-CEX into the 7-year undergraduate program. After receiving permission from the ABIM (personal communication, December 2004), we translated the mini-CEX rating form into Chinese and developed a 4-hour workshop for preceptor training. The mini-CEX workshop was mandatory for all preceptors. The feasibility and acceptability evaluations were carried out from November 2005 to April 2006 in a pilot study.<sup>17,18</sup> These evaluations led to the full implementation of the mini-CEX in the Departments of Internal Medicine, Pediatrics, Family Medicine, and Neurology beginning in May 2006.<sup>19</sup> The final-year medical students were assessed on 4 or more occasions during rotations in these 4 departments.

We utilized the first 3 levels of Kirkpatrick’s model,<sup>13</sup> namely Reaction, Learning, and Behavior, to assess the influence of mini-CEX. Outcomes at the Results level were not assessed, as they were beyond the scope of this survey. A 2-page, 21-item questionnaire covering preceptor reactions to mini-CEX, relearning after the mini-CEX, and behavior change in clinical practice was developed. We used a 5-point Likert-scale with responses from strongly agree to strongly disagree for the Reaction and Behavior items. Relearning of clinical skills focused on 6 of the 7 domains addressed by the

TABLE 1. Four-Level Kirkpatrick Model and Survey Items Used in This Study

Levels	Description*	Items Used in This Survey
Reaction	“A measure of how participants feel about the various aspects of a training program” or how “participants are motivated and interested in learning”	Has being a preceptor increased your reflections on clinical practice? How the mini-CEX impacts on your practice using these 6 clinical skills.
Learning	“A measure of the knowledge acquired, skills improved, or attitudes changed due to training”	Have you ever gone back to the textbooks or the medical journals for refreshing the clinical skills related to mini-CEX? How many times have you relearned the following clinical skills after being a preceptor?
Behavior	“A measure of the extent to which participants change their on-the-job behavior because of training”	Has being a preceptor increased your confidence in professional development in clinical practice? Has being a preceptor increased your quality of health care in clinical practice?
Results	“A measure of the final results that occur due to training”	(Not measured)

\*Quotes are from Kirkpatrick’s 1996 article.<sup>13</sup>

mini-CEX; the domain of overall clinical competence was excluded due to nonspecificity. The demographics section gathered information about gender, age, medical specialty, clinical seniority, and the number of times the respondent conducted the mini-CEX prior to completing the questionnaire. The preliminary questionnaire was pilot-tested by 6 preceptors and revised in response to their feedback. The final questionnaire was then sent to all 177 physicians in the previously mentioned 4 departments via the administration offices in May 2010, followed by 2 reminders. Responses were collected over a period of 4 weeks.

For statistical analysis we used SAS version 9.2 (SAS Institute Inc, Cary, NC). Due to the small number of respondents in some subgroups, 3 variables were recoded: age, clinical seniority, and experience conducting the mini-CEX. Age was recoded into three categories: 20–29, 30–39, and 40 or more years old. Clinical seniority was recoded as either faculty (attending physician or fellow house staff) or resident (including chief resident). The experience of precepting the mini-CEX was recoded as either 1–10 or more than 10 times. Descriptive statistics such as proportion were used to characterize the study population. The frequency of relearning mini-CEX skills, used for assessing Kirkpatrick's Learning level, was defined as a continuous variable. The mean and standard deviation were used to describe the preceptors' responses to questions at the levels of reaction, learning, and behavior. Student's *t*-test was used to test the differences in frequency of relearning based on clinical seniority and previous mini-CEX experience. One-way analysis of variance (ANOVA) was used when there were more than 2 subgroups, and the multiple comparison tests were performed using the Bonferroni tests.

## Results

A total of 134 written survey responses were collected. Of these, 9 were from respondents who had no prior mini-CEX experience and were excluded from study, resulting in a response rate of 70.6% (125/177). The demographic characteristics of the remaining 125 respondents are listed in TABLE 2. Reliability of the survey, as determined by internal consistency, was found to be high (Cronbach alpha = 0.899).

### Reaction

TABLE 3 shows both the percentage of preceptors who agreed or disagreed with each question and the average response. Specifically, 78 respondents (62.4%) agreed or strongly agreed with the survey question "Has being a preceptor increased your reflections on clinical practice?" TABLE 3 also shows that more than 50% of the preceptors (in a range from 52% to 65.6%) agreed or strongly agreed with the positive impact of mini-CEX on their own practice in the 6 clinical skill domains. Only 3% to 5% of preceptors disagreed or strongly disagreed with statements describing positive

TABLE 2. Mini-CEX Preceptors' Characteristics

Characteristics	Number (%)
<b>Gender</b>	
Male	93 (74.4%)
Female	32 (25.6%)
<b>Age</b>	
20–29 years old	29 (23.2%)
30–39 years old	63 (50.4%)
≥40 years old	33 (26.4%)
<b>Medical Specialty</b>	
Internal medicine	72 (57.6%)
Pediatrics	23 (18.4%)
Family medicine	15 (12.0%)
Neurology	15 (12.0%)
<b>Clinical Seniority</b>	
Attending physicians	57 (45.6%)
Fellow house staff	12 (9.6%)
Chief resident	22 (17.6%)
Resident	34 (27.2%)
<b>Previous Mini-CEX Experience</b>	
1–5	17 (13.6%)
6–10	12 (9.6%)
> 10	96 (76.8%)

impacts of precepting the mini-CEX. Comparisons based on demographic variables such as gender, age, medical specialty, clinical seniority, and previous experience of mini-CEX showed no significant difference.

### Learning

Responses to the survey question "Have you ever gone back to the textbooks or the medical journals for refreshing the clinical skills related to mini-CEX?" showed that physical examination skills were relearned by 95.2% of the respondents. More than 80% of said they had relearned the other 5 clinical skills (87.1% on counseling skills, 86.4% on clinical judgment, 85.6% on medical interviewing skills, 84.8% on humanistic qualities/professionalism, and 82.3% on organization/efficiency). Only 5 respondents (4%), all of whom were residents, reported that they had never relearned any of the skills.

Responses to the question "How many times have you relearned the following clinical skills after being a preceptor?" are summarized in TABLE 4 by age, clinical seniority, and previous mini-CEX experience. Age group comparisons showed that preceptors over 40 years of age

TABLE 3. The Preceptors' Response on Kirkpatrick's Reaction and Behavior Change After Practicing Mini-CEX

	Mean Response* $\pm$ Standard Deviation	Percent Strongly Agree or Agree*	Percent Strongly Disagree or Disagree*
Reaction (Kirkpatrick level 1)			
Increase reflections	3.66 $\pm$ 0.77	62.4%	4.0%
Positive impact on clinical skills			
1. Medical Interviewing	3.64 $\pm$ 0.65	65.6%	3.2%
2. Physical Examination	3.59 $\pm$ 0.65	63.2%	3.2%
3. Counseling	3.52 $\pm$ 0.63	54.4%	4.0%
4. Clinical judgment	3.53 $\pm$ 0.66	55.2%	3.2%
5. Organization/Efficiency	3.53 $\pm$ 0.67	54.4%	3.2%
6. Humanistic Qualities/ Professionalism	3.50 $\pm$ 0.74	52.0%	4.8%

\*Likert scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree.

reported they had relearned the skills of medical interviewing, physical examination, counseling, and humanistic qualities/professionalism significantly more frequently than the younger preceptors. With the exception of clinical judgment, faculty members said they had relearned clinical skills significantly more frequently than the residents. Those who had more than 10 mini-CEX encounters also relearned medical interviewing, physical examination, and humanistic qualities/professionalism more frequently than the less experienced preceptors (TABLE 4).

### Behavior Changes

About one-third of respondents agreed or strongly agreed with the questions "Has being a preceptor increased your

confidence in professional development in clinical practice?" (35.2%) and "Has being a preceptor increased your quality of health care in clinical practice?" (35.2%). However, most chose "neutral" in response to these 2 questions (52% and 48%, respectively). None of the subgroup analyses showed a significant difference.

### Discussion

The mini-CEX has well-established psychometric properties that facilitate the learning and assessment of the clinical skills of trainees. This report provides preliminary evidence that the mini-CEX also contributes to the professional development of preceptors. According to cognitivist learning theory, developing critical thinking through reflection is one

TABLE 4. The Frequency of Relearning the Clinical Skills Related to Mini-CEX by Age, Clinical Seniority, and Previous Mini-CEX Experience

	Age (years)			Clinical Seniority			Previous Mini-CEX Experience		
	20–39 (n = 92)	$\geq$ 40 (n = 33)	p-value*	Resident (n = 56)	Faculty (n = 69)	p-value*	1–10 (n = 29)	>10 (n = 96)	p-value*
Medical Interviewing	2.66 $\pm$ 1.22	4.28 $\pm$ 1.20	0.0012	2.32 $\pm$ 1.35	3.70 $\pm$ 1.11	0.0021	2.06 $\pm$ 1.03	3.40 $\pm$ 1.29	0.0116
Physical Examination	3.22 $\pm$ 1.10	4.40 $\pm$ 1.23	0.0106	2.96 $\pm$ 1.17	4.00 $\pm$ 1.10	0.0129	2.60 $\pm$ 0.99	3.82 $\pm$ 1.17	0.0131
Counseling	2.76 $\pm$ 1.17	4.00 $\pm$ 1.16	0.0112	2.50 $\pm$ 1.26	3.56 $\pm$ 1.09	0.0137	2.32 $\pm$ 1.02	3.32 $\pm$ 1.23	0.0528
Clinical Judgment	3.06 $\pm$ 1.24	3.68 $\pm$ 1.33	0.2315	2.78 $\pm$ 1.31	3.58 $\pm$ 1.21	0.0784	2.60 $\pm$ 1.02	3.42 $\pm$ 1.32	0.1301
Organization/Efficiency	2.58 $\pm$ 1.15	3.38 $\pm$ 1.20	0.0918	2.22 $\pm$ 1.19	3.24 $\pm$ 1.11	0.0161	2.22 $\pm$ 0.95	2.96 $\pm$ 1.22	0.1394
Humanistic Qualities/ Professionalism	2.42 $\pm$ 1.12	3.80 $\pm$ 1.15	0.0030	2.14 $\pm$ 1.15	3.30 $\pm$ 1.13	0.0055	1.98 $\pm$ 0.87	3.02 $\pm$ 1.22	0.0135

\*Mean  $\pm$  standard deviation, compared by Student's *t*-test.

of the most important components of the learning process.<sup>20</sup> A recent review on reflection in the education of health professionals concluded that reflective capacity is regarded as an essential attribute for professional competence.<sup>21</sup> Our survey showed that preceptors reported that the mini-CEX had positive impacts on their daily clinical practice and increased their reflections on their own patient care as a physician. From the starting point of reflection, the mini-CEX may facilitate critical thinking and improve professional competence.

Another principle of cognitivist learning theory is that meaningful learning results from relating new knowledge to what is already known.<sup>20</sup> Knowledge, experience, and insights derived from experience are essential in helping physicians to become progressively more skillful and maintain their professional competence. The interactions with patient and trainee during mini-CEX may stimulate preceptors to relearn something and to connect and integrate new learning into existing knowledge and skills. This survey showed that 96% of the responders have relearned at least 1 of the skills related to mini-CEX. It should be regarded as an added functionality of mini-CEX that the preceptors who bring many years of professional experience to conduct the mini-CEX relearn these basic skills in the process.

Internationally, there is a move to use continuing professional development to foster the continuous acquisition of new knowledge, skills, and attitudes as a means of enabling competent practice.<sup>22</sup> Participation in educational activities such as courses, seminars, case conferences, practice-based activities, and Web-based materials are seen as avenues to professional development.<sup>22</sup> Our report shows that a mini-CEX also can facilitate professional development for the preceptors. We believe that the principles of adult learning provide insight into why and how the mini-CEX produces this outcome.<sup>23,24</sup> First, the clinical skills related to the mini-CEX are relevant and important to the preceptor's professional needs. The mini-CEX experience effectively integrates ongoing learning and day-to-day clinical activities. Adult learning theory posits that preceptor learning is enhanced through direct, concrete experiences in which the learning is directly applicable to real work. Second, the mini-CEX stimulates self-directed learning. During the process of relearning, the preceptors are the origin of their own learning and thus have control over the what, when, and how of their learning. Finally, the adult learner's ego is involved in his or her performance. Preceptors faced with the expectation of providing a role model appearing knowledgeable to their students may have to relearn the clinical skills more thoroughly to reduce the fear of judgment during mini-CEX encounters. Although doctors in a medical center have many ways to enhance their professional development, the mini-CEX, by embodying principles of adult learning and linking learning and clinical practice, provides another alternative for their continuing professional development.

Of particular interest is the finding that the attending physician or fellow house staff is more likely to report relearning a clinical skill than the chief resident or resident.

### Lessons for Practice

- Using a survey based on Kirkpatrick's levels of Reaction, Learning, and Behavior, this study provides evidence that serving as a preceptor for a mini-CEX stimulates reflection, and enhances one's own active learning and professional development.
- Experienced preceptors, as identified by clinical seniority, age, or previous mini-CEX experience, were likely to report that they had relearned the clinical skills related to mini-CEX more frequently than less experienced preceptors.
- Replication of this study in teaching hospitals in other cultural contexts and in-depth analyses of the various mechanisms for sustainable and continuous professional development in clinical practice are suggested for further research.

These differences may arise in part from the different working patterns of these 2 groups; residents are often short of time or lack of motivation due to the fact that most of them are not teaching faculty.<sup>25,26</sup> Another possible reason that faculty members displayed more willingness to relearn may be that the promotion system in a medical center like our hospital is one in which only those "hard-working learners" are recruited to be attending physicians.<sup>27,28</sup> It may also be that there is simply a greater need for relearning among attending physicians. It is generally believed that greater clinical experience enhances knowledge and skill; however, in a recent review the authors concluded that physicians who have been in practice longer may be at greater risk for providing lower-quality health care.<sup>29</sup>

There are several limitations to the current study, most notably our reliance on self-reporting to assess outcomes. Although respondents reported multiple beneficial effects of the mini-CEX, we cannot determine whether there are actual or perceived changes. These findings, though not captured objectively, still provide some useful information. In addition, clinical judgment, counseling, and organization/efficiency are less well-defined skills than clusters of related competencies. These complications make it difficult to draw clear-cut conclusions about differences in relearning among the 6 skill areas we examined. The present study was also limited by the small sample size and the selection of participants from a single hospital, which reduces the generalizability of the results. Finally, the impact of cultural and other contextual factors on preceptor learning from the mini-CEX are unknown.

In summary, we found that precepting a mini-CEX appears to have positive impacts on preceptors' reactions,

knowledge, skills, and attitudes, and, to some extent, behavior. Our results suggest that the mini-CEX encounter provides preceptors with an opportunity to reflect, relearn, and incorporate what is learned into their current practice. Further study is needed to determine if similar results can be found in academic medical centers in other settings, explain differences in outcomes between attending physicians and trainees, and assess whether our findings can be replicated when more objective outcome measures are employed.

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