

Original Article

Application of multiple-station mini-CEX evaluation combined with scenario simulation assessment for teaching nursing interns in the emergency department

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Abstract: Objective: To explore the application of multiple-station mini-CEX evaluation combined with scenario simulation assessment to teach nursing interns in the emergency department. Methods: A total of 146 nursing interns who were taught in department of emergency medicine were selected and grouped according to different teaching schemes. In this prospective study, 73 nursing interns who were taught according to multiple-station mini-CEX evaluation combined with scenario simulation assessment scheme were enrolled in the observation group; and 73 nursing interns who were taught according to the scenario simulation assessment scheme were enrolled as the control group. Mini-CEX scores, theoretical and practice results and their correlation were compared between the two groups, and clinical teaching satisfaction was also compared. Results: Nursing interns in the two groups after being taught had increased mini-CEX scores than at their department entrance ($P < 0.05$). There were higher mini-CEX scores ($P < 0.05$), better theoretical and practice results ($P < 0.001$), and improved satisfaction degree and teaching methods ($P < 0.05$) to clinical teachers at department exit in the observation group than those in control group. There was a positive correlation between mini-CEX scores and theoretical results ($r = 0.737$, $P < 0.001$) and a positive correlation between mini-CEX scores and practice results ($r = 0.636$, $P < 0.001$). Conclusion: Multiple-station mini-CEX evaluation combined with scenario simulation assessment can enhance and better evaluate the clinical competence of nursing interns and improve clinical teaching satisfaction, which is worthy of popularization and application in clinical teaching.

Keywords: Mini-CEX evaluation, scenario simulation assessment, emergency department, nursing interns, teaching

Introduction

When training medical students it is necessary to strengthen the development of clinical skills for excellent medical graduates, in addition to emphasizing theoretical education [1]. As early as the 1990s, it was proposed that it is important to assess medical students' skills in foreign countries, and in 1995 the mini-clinical evaluation exercise (mini-CEX) was developed for teaching and evaluation [2]. Mini-CEX can effectively evaluate the actual clinical skills of students, and its reliability has been proven in several studies [3-5]. In spite of mini-CEX's good value for evaluation of clinical skills, some scholars have recognized the deficiency of mini-CEX; they think mini-CEX evaluation may be influenced and biased by many external factors, such as teacher quality of teaching clinical skills, existing professional level, subjective

learning attitude and education background of students, and the degree of difficulty for disease evaluation [6, 7]. What's more, mini-CEX evaluation is usually implemented for one patient and one disease. However, medical staff in the emergency department need to be equipped with comprehensive emergency skills, since they are required to treat various and complicated diseases in the emergency department. To better demonstrate the mastery of comprehensive emergency skills and implement the education and training plan, multiple-station mini-CEX evaluation has been developed from mini-CEX evaluation to evaluate various diseases; which is more conducive to the improvement of comprehensive skills of medical staff in the emergency department. However, there is no report on the application of multiple-station mini-CEX evaluation in nursing students. Moreover, scenario simulation

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assessment is a teaching model based on situated cognition theory not only commonly used in clinical practice, but also in teaching nursing and hospital training [8, 9]. In this study, multiple-station mini-CEX evaluation combined with scenario simulation assessment was applied to explore its significance and value in teaching for nursing interns in the emergency department, since there has no relevant literature reported as of yet.

Materials and methods

Clinical data

A total of 146 nursing interns who were taught in the department of emergency medicine of Wuhan Central Hospital Affiliated with Tongji Medical College of Huazhong University of Science and Technology from January 2017 to December 2019 were selected and grouped according to different teaching schemes. In this prospective study, 73 nursing interns who were taught according to multiple-station mini-CEX evaluation combined with scenario simulation assessment scheme were enrolled as the observation group; and 73 nursing interns who were taught according to the scenario simulation assessment scheme were enrolled as the control group.

Inclusive criteria: Students who have been taught in the department of emergency for at least 2 months; and students aged 18-25. **Exclusion criteria:** Students who were sick and had to leave for more than 10 days during learning; students who had a strong psychological resistance to teaching methods and refused to participate in this study. This study was approved by the Ethics Committee of Wuhan Central Hospital Affiliated with Tongji Medical College of Huazhong University of Science and Technology, and all participants signed the informed consent form.

Methods

The teaching methods of the scenario simulation assessment was used in the control group. Specific scheme: PPT teaching was performed to introduce common diseases and the plan of implementation for nursing measures in the 1st, 4th and 8th week after nursing interns entered the department. Scenario simulation was constructed based on the explained disease: the clinical teacher used a clinical case as the basis of the scenario simulation to prepare a

scenario case which is consistent with the actual situation for nursing work in the emergency department. Nurses who have more than three years of experience served as standardized patients in the scenario simulation. Corresponding nursing and treatments were performed for standardized patients in the simulation. Nursing skills involved in the simulated scenario were discussed afterward; problems raised in the nursing process and corresponding solutions were discussed; the clinical teacher then summarized the shortcomings and improvement measures in the scenario simulation. Students summarized the cases in the scenario simulation, and reported their assessments of the cases.

In addition to the scenario simulation, multiple-station mini-CEX evaluation was used in the observation group. Specific scheme: Students first finished the above scenario simulation. Grouped students performed the interview and examination on patients after consent was obtained from the patients and their families. Students received multiple-station mini-CEX evaluation when they were facing patients with three selected diseases, to train their comprehensive emergency skills.

Outcome measures

Mini-CEX evaluation was used to evaluate the clinical skills of nursing interns at department entrance and exit. Comprehensive emergency skills were evaluated from 7 dimensions. Each dimension was divided into three levels with the corresponding scores: unsatisfactory 1-3 points, satisfactory 4-6 points, and superior 7-9 points [10].

Theory and practical operation were both assessed for each nursing intern at department exit, with a full score of 100.

Satisfaction degree according to clinical teachers and the students teaching methods was assessed, with a maximum score of 10 points, including unsatisfactory with 1-3 points, general with 4-6 points, satisfactory with 7-9 points, and very satisfactory with 10 points [11].

Statistical analysis

The data were analyzed with SPSS 17.0 statistical software. The continuous variables were expressed as mean \pm standard deviation ($\bar{x} \pm sd$), and the data conforming to a normal dis-

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Table 1. Comparison of general data of nursing interns and clinical teachers ($\bar{x}\pm sd, n$)

	Observation group (n=73)	Control group (n=73)	χ^2/t	P
Gender (male/female)	13/60	15/58	0.177	0.674
Age (year)	21.2 \pm 1.4	21.5 \pm 1.6	0.692	0.492
Highest education			0.251	0.616
Regular college course	40	43		
Junior college	33	30		
Seniority of clinical teachers (year)	7.3 \pm 1.9	7.5 \pm 2.1	0.434	0.342

Table 2. Comparison of mini-CEX scores of nursing interns at department entrance and exit ($\bar{x}\pm sd$)

	At department entrance				At department exit			
	Observation group	Control group	t	P	Observation group	Control group	t	P
Medical interviewing skills	3.45 \pm 0.51	3.48 \pm 0.45	0.968	0.378	6.74 \pm 1.23 ^a	5.33 \pm 1.14 ^a	3.745	0.027
Physical examination skills	3.13 \pm 0.37	3.13 \pm 0.35	0.584	0.654	7.08 \pm 1.23 ^a	5.34 \pm 1.21 ^a	4.426	0.021
Humanistic qualities	3.16 \pm 0.68	3.14 \pm 0.62	0.869	0.512	7.16 \pm 1.08 ^a	5.12 \pm 0.98 ^a	5.261	0.002
Clinical judgment	3.34 \pm 0.57	3.31 \pm 0.51	0.802	0.562	7.32 \pm 1.09 ^a	5.91 \pm 1.12 ^a	3.125	0.041
Counseling skills	3.76 \pm 0.48	3.74 \pm 0.47	0.658	0.502	6.98 \pm 0.87 ^a	5.37 \pm 1.23 ^a	3.515	0.030
Organization	4.17 \pm 1.42	4.16 \pm 1.39	0.854	0.514	7.56 \pm 1.19 ^a	5.47 \pm 1.22 ^a	4.384	0.019
Overall clinical competence	3.63 \pm 0.61	3.62 \pm 0.53	0.703	0.575	7.34 \pm 1.12 ^a	6.12 \pm 1.23 ^a	3.154	0.035
Total points	24.79 \pm 0.58	25.12 \pm 0.62	0.529	0.463	50.21 \pm 4.23 ^a	43.22 \pm 4.31 ^a	6.092	<0.001

Note: Compared within the group at department entrance, ^aP<0.05. mini-CEX: mini-clinical evaluation exercise.

Table 3. Comparison of theoretical and practice results ($\bar{x}\pm sd$)

	Theoretical results	Practice results
Observation group	90.12 \pm 7.19	92.48 \pm 7.45
Control group	83.92 \pm 8.29	82.12 \pm 7.23
t	8.892	7.892
P	<0.001	<0.001

tribution and homogeneity of variance were tested by t test. Comparison between groups was performed using independent-sample t test, while comparison within the group before and after training was carried out using paired-sample t test, which was expressed as t. The enumeration data were analyzed by Pearson chi-square test, which was expressed as χ^2 . Pearson product-moment correlation was used to analyze the linear dependence between two variables. P<0.05 was considered a significant difference.

Results

Comparison of general data of nursing interns and clinical teachers

There were no differences in gender, age and education level of nursing interns and seniority

of clinical teachers between the two groups (P>0.05, **Table 1**).

Comparison of mini-CEX scores of nursing interns at department entrance and exit

There was no difference in mini-CEX scores between two groups for nursing interns at department entrance (P>0.05).

Nursing interns in the two groups after being taught had increased mini-CEX scores at department exit compared to department entrance (P<0.05). Mini-CEX scores at department exit in the observation group were higher than those in the control group (P<0.05, **Table 2**).

Comparison of theoretical and practice results

Theoretical and practice results in the observation group were better than those in the control group (P<0.001, **Table 3**).

Correlation between mini-CEX scores and theoretical and practice results

A correlation study between mini-CEX scores and the theoretical and practice results at department exit showed that there was a positive correlation between mini-CEX scores and

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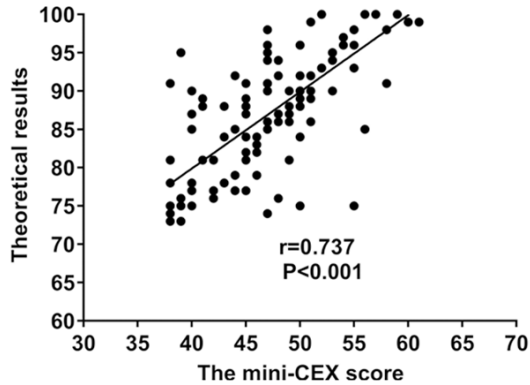


Figure 1. Correlation between mini-CEX scores and theoretical results. Mini-CEX: mini-clinical evaluation exercise.

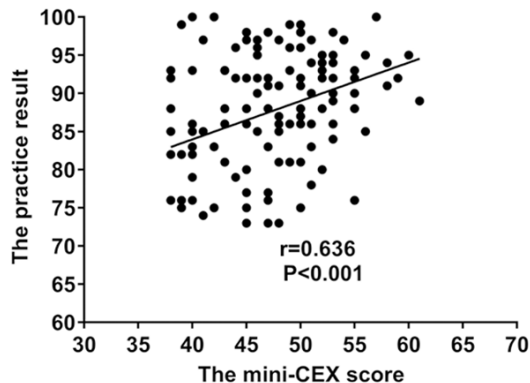


Figure 2. Correlation between mini-CEX scores and practice results. Mini-CEX: mini-clinical evaluation exercise.

theoretical results ($r=0.737$, $P<0.001$) and a positive correlation between mini-CEX scores and practice results ($r=0.636$, $P<0.001$, **Figures 1 and 2**).

Comparison of satisfaction for clinical teachers and teaching methods

Satisfaction degree for clinical teachers and teaching methods in the observation group were better than that in the control group ($P<0.05$, **Table 4**).

Discussion

In the current educational reform, quality-oriented education is increasingly advocated. The improvement of clinical practice skills and quality has been highlighted to keep pace with theoretical knowledge and education. How to practice combined theoretical knowledge and clinical skills and reflect the quality of medical

students has become the emphasis and challenge in clinical teaching. The assessment items of the mini-CEX can assess the core competence of nurses and are compatible with the nursing procedures in the assessment process, so it is applied to assess the clinical competence of nurses [12, 13]. As early as 2008, mini-CEX evaluation was used in the nursing professions in Taiwan and China to confirm its feasibility; the high application value of mini-CEX has been confirmed in many countries [14]. Previous study has shown that mini-CEX can have the dual functions of teaching and evaluation of clinical competence, which promotes the improvement of clinical skills and practical confidence of nursing interns [15]. Another study found that the application of the scenario simulation and role-playing combined with mini-CEX significantly improved communication skills and teamwork skills of nursing interns [16]. However, some studies have pointed out that mini-CEX evaluation was highly subjective, so the consistency and accuracy of teacher evaluation were important factors affecting its accuracy [17]. Therefore, it is believed that regular training for teachers, increased evaluation frequency, and refinement of scores of practical items can reduce the differences in evaluation from different teachers [5, 18]. In this study, we found that multiple-station mini-CEX combined with scenario simulation for teaching and assessment significantly improved the clinical competence of nursing interns in the observation group, which showed better function than the scenario simulation in control group. It was consistent with the above study results.

In this study, we further found that teaching and assessment through multiple-station mini-CEX combined with scenario simulation had a positive impact on the theoretical and practice results at department exit. The theoretical and practice results at department exit in the observation group, in which multiple-station mini-CEX combined with scenario simulation teaching and assessment was applied were significant higher than those in control group. A correlation study between mini-CEX scores and theoretical and practice results at department exit showed that nursing interns with higher mini-CEX scores had higher final theoretical and practice results, indicating that mini-CEX evaluation can reflect the competence level of nursing interns. Previous studies have suggest-

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Table 4. Comparison of satisfaction to clinical teachers and teaching methods (n/%)

	Unsatisfactory	General	Satisfactory	Very satisfactory
Observation group	2 (2.74)	12 (16.44)	36 (49.32)	23 (31.51)
Control group	4 (5.48)	28 (38.36)	28 (38.36)	13 (17.81)
χ^2			10.488	
P			0.013	

ed the high value of mini-CEX evaluation [19, 20]. Some studies indicated that mini-CEX evaluation is not accurate in instrument operating skill assessment [6, 21]. Mini-CEX is especially useful in timely feedback and solutions of problems, which helps to deepen the understanding and operating of skills. Some study has shown that teaching by mini-CEX method has significantly higher student satisfaction [18]. In this study, we also found that multiple-station mini-CEX combined with scenario simulation improved nursing interns' satisfaction of teaching, which was consistent with the above previous studies.

One of the shortcoming of this study was that a multi-center large-sample study was not adopted, with only a single case source and small sample size. Therefore, the sample size should be expanded, and multi-center clinical studies should be further carried out.

In summary, multiple-station mini-CEX evaluation combined with scenario simulation assessment can enhance and evaluate the clinical competence of nursing interns in addition to improve clinical teaching satisfaction, which is worthy of popularization and application in clinical teaching.

Disclosure of conflict of interest

None.

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