

# Role-play of real patients improves the clinical performance of medical students

Ling-Ju Huang<sup>a,b</sup>, Hui-Chun Huang<sup>a,b</sup>, Chiao-Lin Chuang<sup>a,b</sup>, Shu-Luen Chang<sup>c</sup>, Hung-Cheng Tsai<sup>d</sup>, Dai-Yin Lu<sup>a,b</sup>, Ying-Ying Yang<sup>a,b,e</sup>, Ching-Chih Chang<sup>a,b,\*</sup>, Hui-Chi Hsu<sup>b,f</sup>, Fa-Yauh Lee<sup>a,b</sup>

<sup>a</sup>Division of General Medicine, Department of Medicine, Taipei Veterans General Hospital, Taipei, Taiwan, ROC; <sup>b</sup>Faculty of Medicine, National Yang-Ming University School of Medicine, Taipei, Taiwan, ROC; <sup>c</sup>Medical Department, Taipei Veterans General Hospital, Hsinchu Branch, Hsinchu, Taiwan, ROC; <sup>d</sup>Division of Allergy, Immunology and Rheumatology, Department of Medicine, Taipei Veterans General Hospital, Taipei, Taiwan, ROC; <sup>e</sup>Division of Clinical Skills Training, Department of Medical Education, Taipei Veterans General Hospital, Taipei, Taiwan, ROC; <sup>f</sup>Cheng-Hsin General Hospital, Taipei, Taiwan, ROC

## Abstract

**Background:** This study aimed to evaluate whether the role-play (RP) of real patients by medical students as part of interactive clinical reasoning training can improve medical students' clinical performance.

**Methods:** A total of 26 medical students volunteered to portray real patients within this program and were treated as the RP group while the other 72 students as the non-RP group. In the interactive morning meeting, the medical students practiced how to approach the RP student as if they were encountering a real patient. All students were evaluated by mini-clinical evaluation exercises (mini-CEX) before and after this training program.

**Results:** We found that all students had an increased total mini-CEX score after 4-week training, especially for interviewing skills. Notably, after training, the RP students had significantly elevated total mini-CEX scores ( $51.23 \pm 1.06$  vs  $53.12 \pm 1.11$ ,  $p = 0.028$ ), and for counselling ( $7.15 \pm 0.14$  vs  $7.54 \pm 0.18$ ,  $p = 0.015$ ) and overall clinical competence ( $7.27 \pm 0.15$  vs  $7.65 \pm 0.16$ ,  $p = 0.030$ ). In contrast, the non-RP students had lower scores compared with the RP group, as revealed by both the pre- and post-training tests. Moreover, their mini-CEX scores were not improved after training.

**Conclusion:** Medical students who were motivated to RP real patients had better performance scores than those who did not. In addition, RP can enhance their counselling skills and clinical competences.

**Keywords:** Education, medical

## 1. INTRODUCTION

To establish a holistic patient care system, it is important to cultivate the young clinician's relevant clinical skills, including medical knowledge, clinical reasoning, communication, interprofessional cooperation, and holistic medicine. However, in spite of the well-designed curriculum, students still experience frustrations when they first encounter real patients in hospital. This is partly due to the patient-centered environment of clinical settings, which differ from the knowledge-centered environment of schools. Furthermore, a lack of experience in doctor-patient relationships is an important factor for why medical students fail to approach real patients appropriately. Emerging evidence has shown that

simulation-based education using standardized patients or role-play (RP) could abolish this gap between knowledge-centered and patient-centered scenarios.<sup>1,2</sup> However, there are difficulties when using standardized patients within training programs, including cost, training requirements, and organizational commitments.<sup>3</sup> In contrast, RP where medical students are used to portray real patients could decrease cost, enhance students' communication skills, and develop their empathy toward patients.<sup>4</sup> A systemic review indicates that RP is an effective and well-adopted learning strategy that is at least equivalent to learning with standardized patients.<sup>5</sup> However, there has been limited evaluation of learning outcome attainment following RP by medical students.

"Give Me Five" is an interactive method of clinical reasoning training developed by the Division of General Medicine at the Taipei Veterans General Hospital (Taipei, Taiwan).<sup>6</sup> The volunteer medical student portrays a real in-patient by portraying their major symptoms in front of the other attendees. The attendees then approach the RP student as if they are interviewing a real patient and take a medical history. Through the interactions between the presenter and the attendees, innovative ideas, differential diagnoses, and plans for further tests and examinations are suggested. This teaching method adds an interactive and fun element to the most challenging part of clinical training and has been well received by the medical students. We previously reported that such an interactive method could improve attendees' self-assessed perceptions, including history taking, physical examination, differential diagnoses, and problem-solving

\*Address correspondence. Dr. Ching-Chih Chang, Divisions of General Medicine, Department of Medicine, Taipei Veterans General Hospital, 201, Section 2, Shi-Pai Road, Taipei 112, Taiwan. E-mail address: ccchang7@vghtpe.gov.tw (C.-C. Chang).  
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capabilities compared with the traditional meeting in which the students presented a patient case and were questioned by the senior doctors.<sup>6</sup> Furthermore, the “Give Me Five” attendees got higher overall objective rater-assessed structured clinical examination scores than their corresponding control group who were trained without the “Give Me Five” initiative.<sup>6</sup>

Although the “Give Me Five” method can enhance the ability of the attendees to apply comprehensive interviewing skills and logical clinical reasoning, whether the role-playing medical students in the “Give Me Five” initiative attain better learning outcomes and clinical competencies than their non-RP peers remains unknown. In the current study, we evaluated the aforementioned measurements using a mini-clinical evaluation exercise (mini-CEX) before and after 4 weeks of “Give Me Five” training.

## 2. METHODS

### 2.1. Research setting and participants

In Taiwan, medical schools offer a 6-year curriculum with the final 2 years being clerkship training, where the students rotate through different departments of the teaching hospital under the supervision of qualified doctors; they usually spend 2-4 weeks in each department. In 2019, a total of 98 5th-year medical students from National Yang-Ming University School of Medicine received their 4-week clerkship training at the Division of General Medicine at Taipei Veterans General Hospital. They received the “Give Me Five” training in the morning meeting 2-3 times per week. The students who volunteered to RP the real patients were assigned to the RP group and the others were assigned to the non-RP group. The RP medical students were asked to review a patient’s medical chart, interview the patient, and perform a physical examination 1 day before the “Give Me Five” meeting. Then he or she played the role of the patient by first presenting their symptoms, followed by disclosure of any present illnesses and a medical history in response to the non-RP students’ inquiries, and in keeping with the findings of their physical examination. Initially, the RP student only provides the chief complaint and the major symptoms of the patient. The attendees, including the other students, interns, and postgraduate residents are then invited to get additional information by asking questions. They can then make at least five possible differential diagnoses and explain their thinking process, which is where the name “Give Me Five” comes from. The students can order examinations and tests to reach their final diagnosis. At the end, the teacher comments on their handling of the case and the trainees’ answers. During the process, interactive discussion is welcomed and highly encouraged. All medical students received a pretraining mini-CEX test at the beginning and a post-training mini-CEX test at the end of the 4-week training. Participation in this RP program was voluntary, and the participants all gave informed signed consent. The study was conducted in accordance with the Declaration of Helsinki (Seoul 2008) and was approved by the Research Ethics Committee of Taipei Veterans General Hospital (2018-07-014B).

### 2.2. Mini-clinical evaluation exercise

The mini-CEX is a method of clinical skills assessment, which was developed by the American Board of Internal Medicine to evaluate the clinical competence of junior doctors. Emerging evidence has shown that the mini-CEX is a powerful evaluation tool for medical students in their clerkship.<sup>7</sup> In the mini-CEX test, students are observed by a senior doctor who assesses their ability to conduct a focused history and physical examination. The student then receives immediate feedback and is rated based on seven different factors (medical interviewing, physical

**Table**

**Mini-Clinical Evaluation Exercise (mini-CEX)**

Medical interviewing skills								
1	2	3	4	5	6	7	8	9
Unsatisfactory				Satisfactory		Superior		
Physical examination skills								
1	2	3	4	5	6	7	8	9
Unsatisfactory				Satisfactory		Superior		
Counselling skills								
1	2	3	4	5	6	7	8	9
Unsatisfactory				Satisfactory		Superior		
Clinical judgment								
1	2	3	4	5	6	7	8	9
Unsatisfactory				Satisfactory		Superior		
Professionalism								
1	2	3	4	5	6	7	8	9
Unsatisfactory				Satisfactory		Superior		
Organized efficiency								
1	2	3	4	5	6	7	8	9
Unsatisfactory				Satisfactory		Superior		
Overall clinical competence								
1	2	3	4	5	6	7	8	9
Unsatisfactory				Satisfactory		Superior		

examination, counselling, clinical judgment, professionalism, organization and efficiency, and overall clinical competence) using a nine-point scale (score 1-3 indicates unsatisfactory; 4-6 indicates satisfactory; 7-9 indicates superior; Table). In this study, all of the participants had pre- and post-“Give Me Five” mini-CEX tests that were conducted by the same evaluator, who did not participate in the “Give Me Five” training and was blinded to the students groupings. Comparisons of the pre- and post-test scores for all students, RP, and non-RP groups were conducted. The mini-CEX scores between the RP- and non-RP medical students were also compared.

### 2.3. Statistical analysis

A  $\chi^2$  test was used to analyze the gender distribution of participants in the RP and non-RP groups. For the group comparisons, Student’s *t*-test was used to compare the mini-CEX scores between the RP and non-RP groups. A paired *t*-test was used to compare the differences between the results of pre- and post-training mini-CEX tests. Statistical significance was assumed when the *p* value was <0.05. The SPSS Statistics version 21.0 program (IBM Corp., Armonk, NY) was used for all statistical analyses.

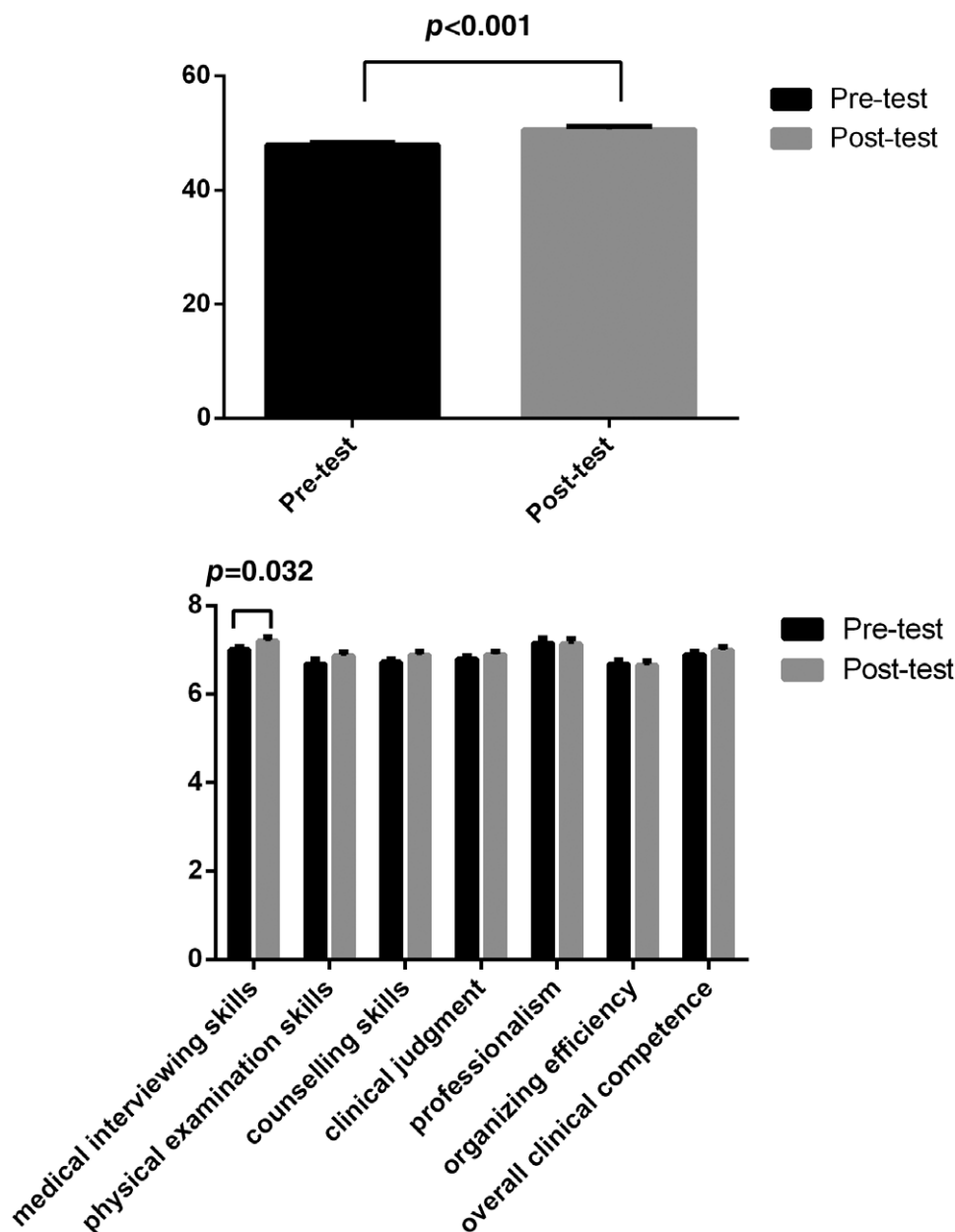
## 3. RESULTS

### 3.1. Gender distribution of RP and non-RP groups

There was no significant difference in the gender distribution between the RP and non-RP groups (RP group, *n* = 26, male:female = 17:9; non-RP group, *n* = 72, male:female = 49:23; both *p* > 0.05).

### 3.2. Pre- and post-training mini-CEX scores

Fig. 1 depicts all the attendees’ pre- and post-training mini-CEX scores, including their score breakdown for medical interviewing, physical examination, counselling, clinical judgment, professionalism, organization and efficiency, and overall clinical competence. The total scores for all attendees were significantly elevated after the 4-week training (pre- vs post-test: 47.90 ± 0.46 vs 50.62 ± 0.57, *p* < 0.001). Among the different training categories, the scores for medical interviewing were



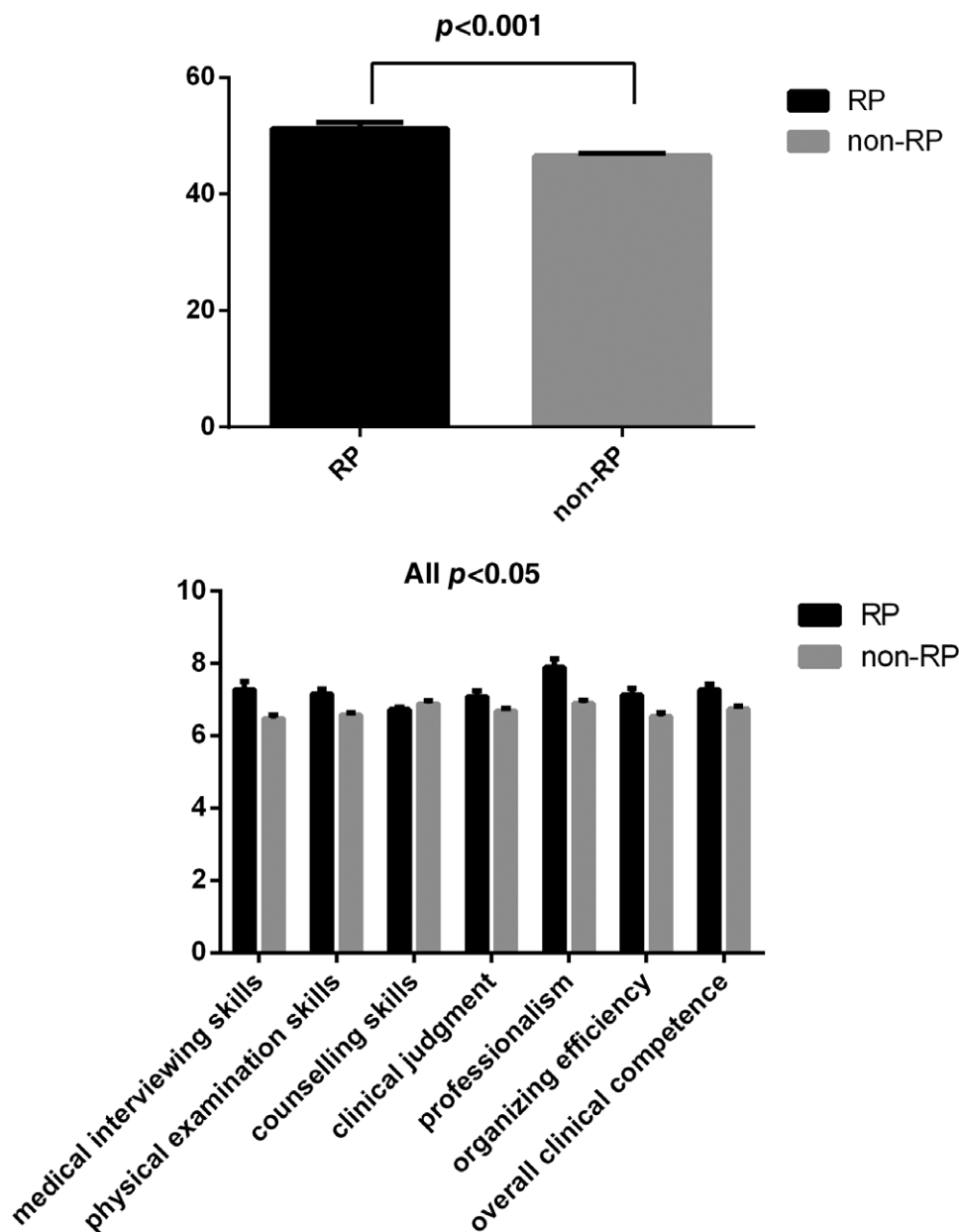
**Fig. 1** The pre- and post-training mini-clinical evaluation exercises scores for all medical students. The upper panel shows that the total score was elevated after the 4-week training program. The lower panel shows that the medical interviewing score was significantly elevated after training. The other assessment categories were not significantly different.

significantly higher after the training ( $7.00 \pm 0.08$  vs  $7.20 \pm 0.10$ ,  $p = 0.032$ ). There was no significant difference between the pre- and post-training scores for the other training categories (physical examination:  $6.68 \pm 0.11$  vs  $6.86 \pm 0.09$ ; counselling:  $6.72 \pm 0.07$  vs  $6.88 \pm 0.09$ ; clinical judgment:  $6.79 \pm 0.07$  vs  $6.89 \pm 0.08$ ; professionalism:  $7.15 \pm 0.11$  vs  $7.14 \pm 0.11$ ; organization and efficiency:  $6.68 \pm 0.09$  vs  $6.65 \pm 0.10$ ; overall clinical competence:  $6.89 \pm 0.07$  vs  $6.99 \pm 0.09$ ; all  $p > 0.05$ , pre- vs post-test scores).

### 3.3. Comparison of pre- and post-training mini-CEX scores in the RP and non-RP groups

Figs. 2 and 3 compare the RP and non-RP groups with regard to their pre- and post-training mini-CEX scores. The RP group had higher total and sub-group mini-CEX scores compared with the

non-RP group, both in the pre- and post-tests (pre-test: RP vs non-RP group: medical interviewing =  $7.46 \pm 0.15$  vs  $6.83 \pm 0.08$ , physical examination =  $7.27 \pm 0.23$  vs  $6.47 \pm 0.11$ , counselling =  $7.15 \pm 0.14$  vs  $6.57 \pm 0.07$ , clinical judgment =  $7.08 \pm 0.16$  vs  $6.68 \pm 0.07$ , professionalism =  $7.88 \pm 0.23$  vs  $6.89 \pm 0.10$ , organization and efficiency =  $7.12 \pm 0.18$  vs  $6.53 \pm 0.10$ , overall clinical competence =  $7.27 \pm 0.15$  vs  $6.74 \pm 0.07$ , total scores =  $51.15 \pm 1.04$  vs  $46.72 \pm 0.43$ , all  $p < 0.05$ ; post-test: medical interviewing =  $7.77 \pm 0.20$  vs  $7.00 \pm 0.99$ , physical examination =  $7.54 \pm 0.17$  vs  $6.61 \pm 0.10$ , counselling =  $7.54 \pm 0.18$  vs  $6.64 \pm 0.08$ , clinical judgment =  $7.35 \pm 0.16$  vs  $6.72 \pm 0.09$ , professionalism =  $8.00 \pm 0.21$  vs  $6.83 \pm 0.10$ , organization and efficiency =  $7.27 \pm 0.17$  vs  $6.43 \pm 0.10$ , overall clinical competence =  $7.65 \pm 0.16$  vs  $6.75 \pm 0.09$ , total scores =  $53.35 \pm 1.11$  vs  $49.64 \pm 0.63$ , all  $p < 0.05$ ).



**Fig. 2** The pre-training mini-clinical evaluation exercise (mini-CEX) scores for the role-play (RP) and non-RP groups. The RP group had a higher total mini-CEX score (upper panel) and was had higher scores for every category of the mini-CEX assessment (lower panel) compared with the non-RP group.

### 3.4. Medical student performance in the RP group after 4-week training

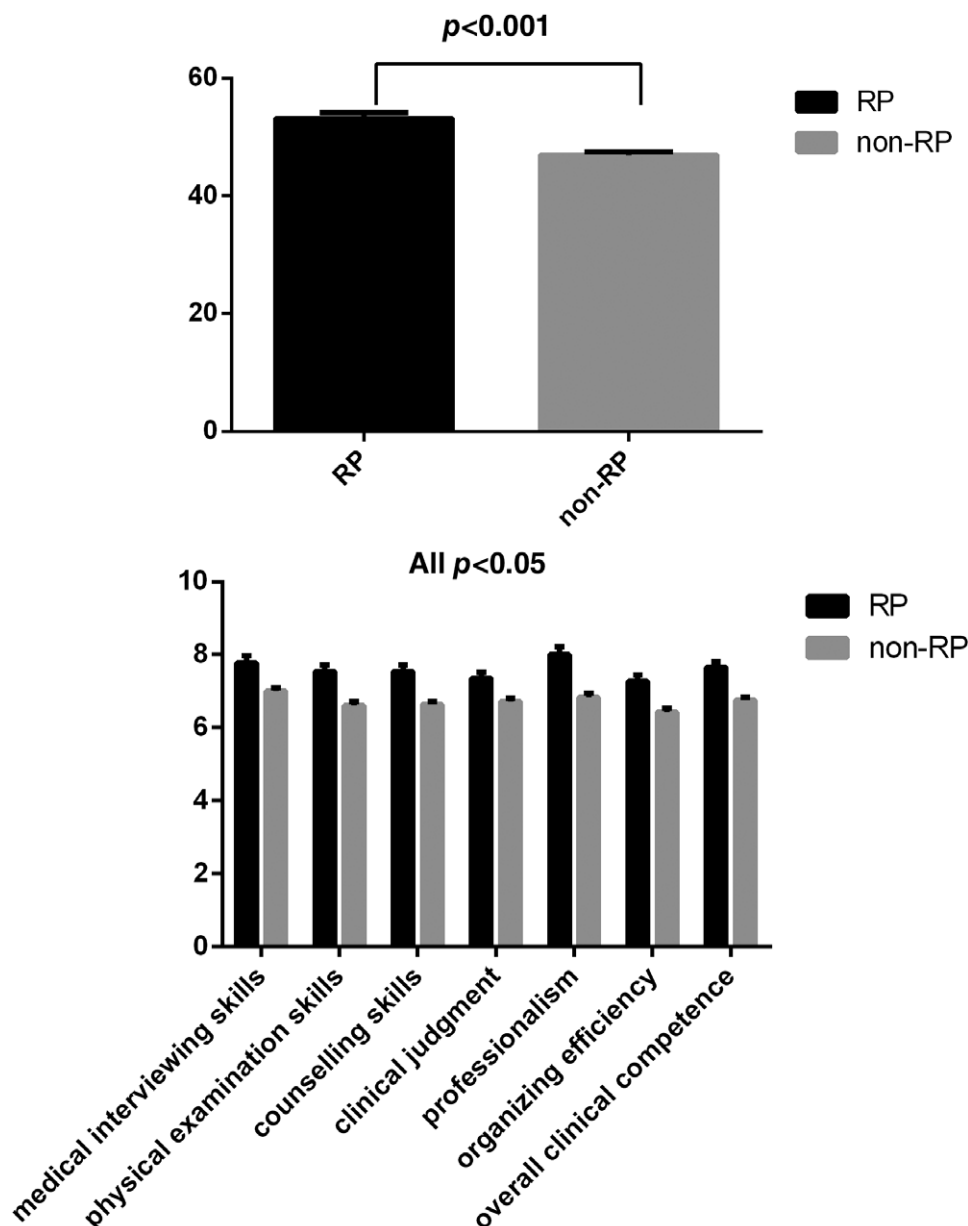
Fig. 4 depicts the pre- and post-training mini-CEX scores in the RP group. The total mini-CEX scores in the RP group were significantly increased after 4-week training (pre- vs post-test:  $51.23 \pm 1.06$  vs  $53.12 \pm 1.11$ ,  $p = 0.028$ ). Among the assessment categories, counselling and overall clinical competence were significantly improved (counselling:  $7.15 \pm 0.14$  vs  $7.54 \pm 0.18$ ,  $p = 0.015$ ; overall clinical competence:  $7.27 \pm 0.15$  vs  $7.65 \pm 0.16$ ,  $p = 0.030$ ). The other categories for the mini-CEX scores were also elevated but they were not significantly different (medical interviewing =  $7.46 \pm 0.16$  vs  $7.77 \pm 0.20$ , physical examination =  $7.27 \pm 0.23$  vs  $7.54 \pm 0.17$ , clinical judgment =  $7.08 \pm 0.16$  vs  $7.35 \pm 0.16$ , professionalism =  $7.89 \pm 0.23$  vs  $8.00 \pm 0.21$ , organization and efficiency =  $7.12 \pm 0.18$  vs  $7.27 \pm 0.17$ , all  $p > 0.05$ ).

### 3.5. Medical student performance in the non-RP group after a 4-week training

Fig. 5 depicts the pre- and post-training mini-CEX scores in the non-RP group. The pre- and post-training total and individual mini-CEX scores were not significantly different in the non-RP group (pre- vs post-test: medical interviewing =  $6.83 \pm 0.08$  vs  $7.00 \pm 0.10$ , physical examination =  $6.47 \pm 0.11$  vs  $6.61 \pm 0.10$ , counselling =  $6.57 \pm 0.07$  vs  $6.64 \pm 0.08$ , clinical judgment =  $6.68 \pm 0.07$  vs  $6.72 \pm 0.09$ , professionalism =  $6.89 \pm 0.10$  vs  $6.83 \pm 0.11$ , organization and efficiency =  $6.53 \pm 0.10$  vs  $6.43 \pm 0.10$ , overall clinical competence =  $6.74 \pm 0.07$  vs  $6.75 \pm 0.09$ , total scores =  $46.58 \pm 0.42$  vs  $46.99 \pm 0.51$ , all  $p > 0.05$ ).

## 4. DISCUSSION

In accordance with our previous report,<sup>6</sup> the present study demonstrated that the interactive “Give Me Five” training method,



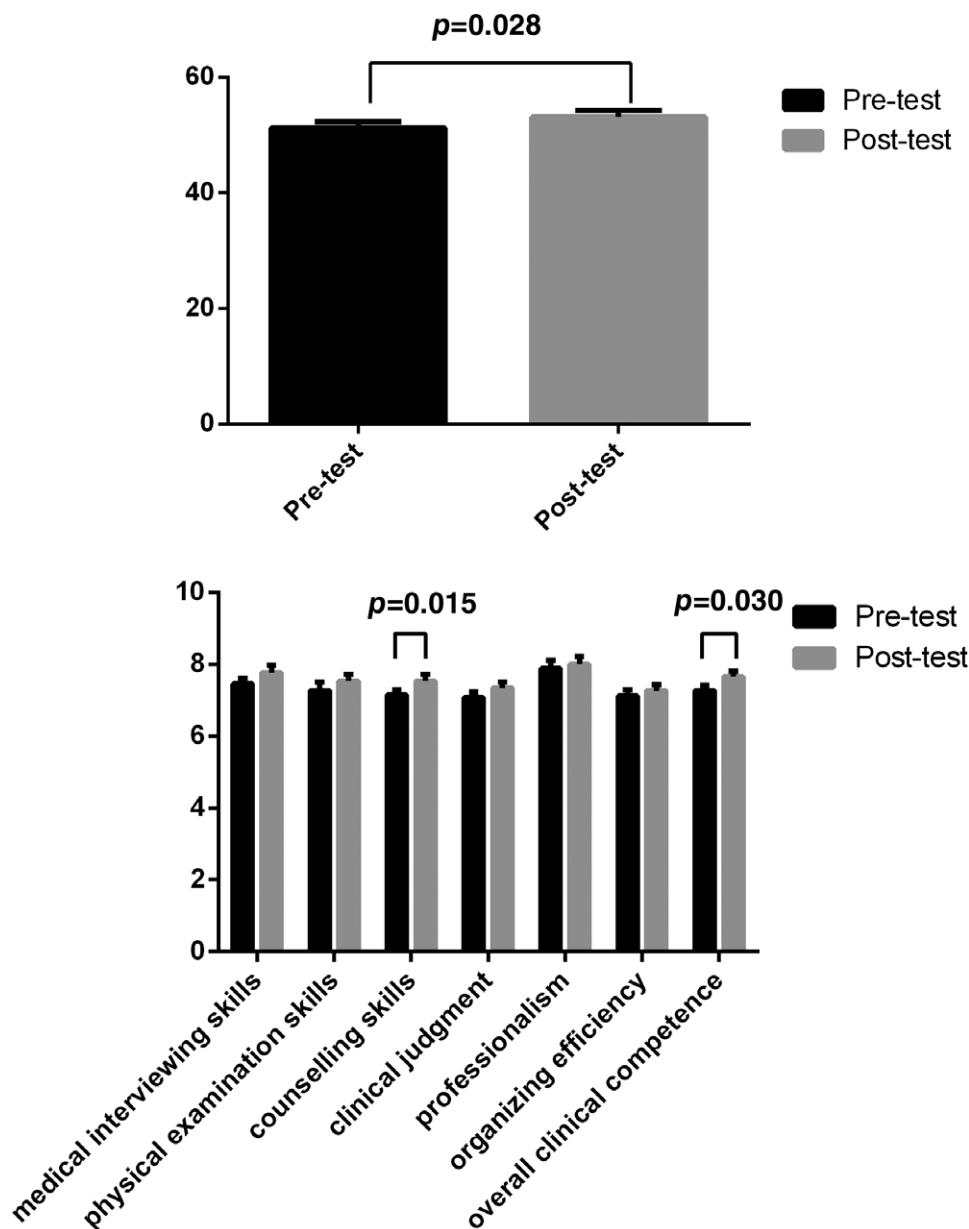
**Fig. 3** The post-training mini-clinical evaluation exercise (mini-CEX) scores for the role-play (RP) and non-RP groups. The RP group had a higher total mini-CEX score (upper panel) and had higher scores for every category of the mini-CEX test (lower panel) compared with the non-RP group.

which focuses on the cultivation of clinical reasoning capabilities, could improve the student's clinical performance as evidenced by elevated mini-CEX scores. Our data showed that using RP within the "Give Me Five" training enhanced the clinical performance of all attendees, especially their interviewing skills. Meanwhile, the most noteworthy finding was that medical students who actively engaged in RP significantly improved their clinical performance as shown by an elevation of their post-training mini-CEX scores, whereas this was not observed in the non-RP students.

RP is an educational strategy in which participants experience emotional and intellectual responses from others, thereby helping them learn appropriate behavior and value.<sup>8</sup> Emerging reports have shown that RP can enhance the communication skills and professionalism of medical students.<sup>9,10</sup> Medical education that focuses on patient-centered care puts a strong emphasis on the development of empathy among medical

students; the experience of "being a patient" is very important for empathy development, and it is often said that "before you become a good doctor, you must have the experience of being a patient."

It has also been reported that "being-in role" is an effective method of enhancing medical students' self-reported empathy.<sup>11</sup> The switching from doctor to patient during RP may also encourage medical students' to view situations from different perspectives, thereby leading to a better understanding of the patients' concerns. Kasai et al.<sup>9</sup> reported that combining RP and peer review improved medical students' performance and professionalism. They found that RP improved medical students' patient attentiveness and their consideration of the patients' psychological and social background, which in turn improved the students' understanding of the importance of patient care. Using the professionalism minievaluation exercise,<sup>12</sup> Kasai et al.<sup>9</sup> also demonstrated that RP improved the



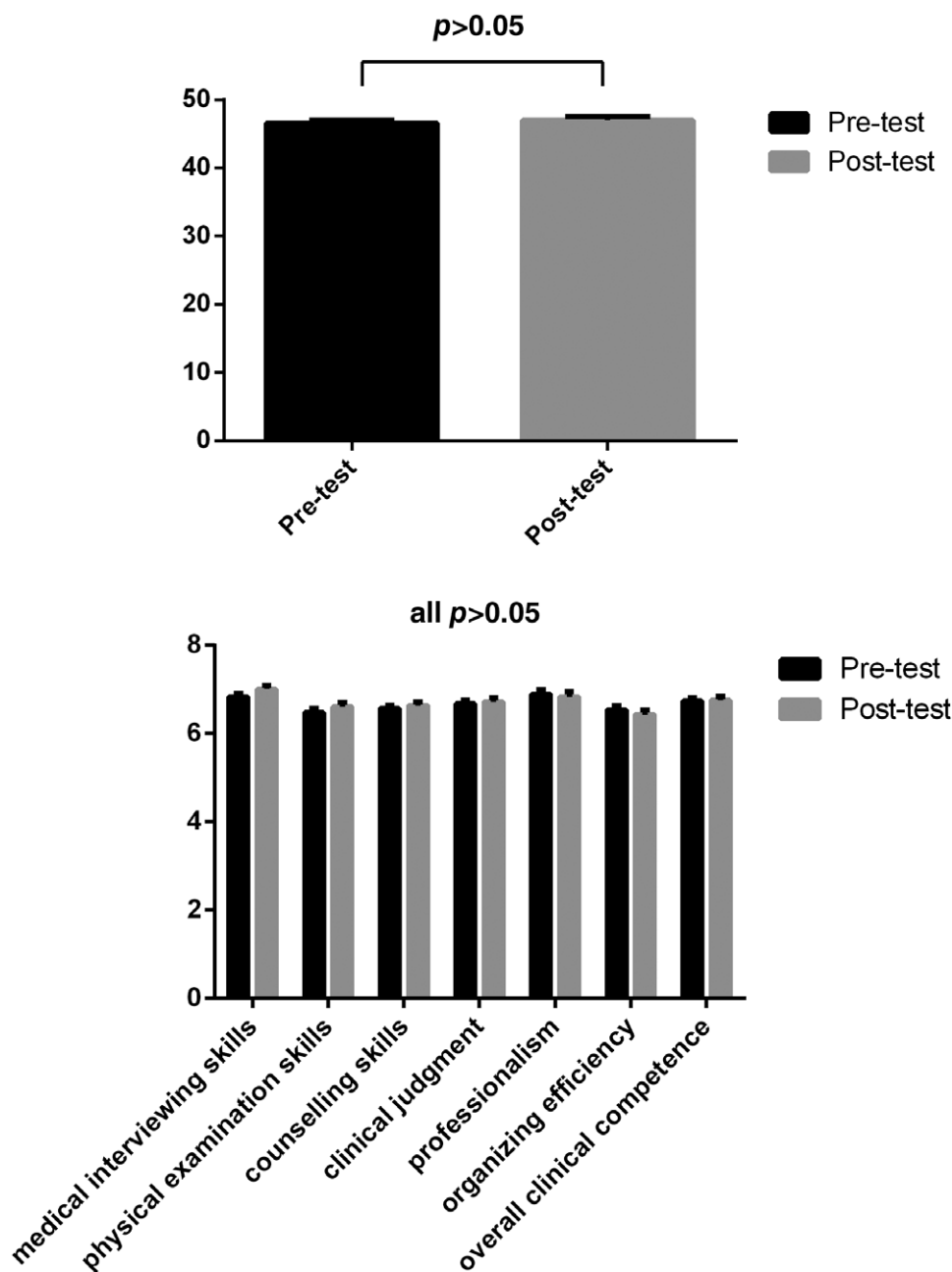
**Fig. 4** The pre- and post-training mini-clinical evaluation exercise (mini-CEX) scores for the role-play (RP) group. The total mini-CEX score was significantly elevated after 4-week training (upper panel). For the individual categories of the test, counselling and overall clinical competence were significantly elevated after training (lower panel).

doctor-patient relationship skills and reflective skills of medical students.

In the present study, we found that using RP for medical student’s interactive clinical reasoning training improved all students overall clinical performance, especially their medical interviewing skills. In accordance with our findings, Park et al.<sup>13</sup> reported that using RP within a teaching program improves medical students’ history taking ability. Although we did not directly evaluate the impact on professionalism in this training program, the narrative feedback from medical students in the RP group showed there had been a positive influence, which was contributed to by the interactive experiences of role-playing real patients.

In addition to the beneficial impacts on communication skills, RP also improves the learner’s enthusiasm and motivation.<sup>14</sup> The innovative method of using RP for case reporting in

“Give Me Five” is interesting and interactive for medical students. The combination of narrative feedback from the medical students, active listening to the RP students’ statements, and the continued interaction between them can enhance students learning and motivation. In addition, we found that clinical performance was better in those who actively engaged in the RP of real patients (RP group), compared with those who did not (non-RP group). In all aspects of the mini-CEX, the RP group had higher scores compared with the non-RP group. Although the higher pretraining mini-CEX scores in the RP group compared with the non-RP group could indicate selection bias when evaluating the impact of RP on the medical students, it was found that the RP group had significantly increased mini-CEX scores after 4-week training. In contrast, the mini-CEX scores were not significantly improved in the non-RP group despite receiving the same training program.



**Fig. 5** The pre- and post-training mini-clinical evaluation exercise (mini-CEX) scores for the non-role-play group. The total and individual aspects of the mini-CEX scores were not significantly different after 4-week training.

Therefore, the results indicate that RP of real patients by medical students enhances clinical performance in spite of selection bias in the current study.

The RP group had increased total mini-CEX scores and significantly better performance for counselling and overall clinical competence after training. Counselling training usually takes time because accompanying real-life patients to understand their concerns cannot be rushed. Takahashi et al.<sup>15</sup> reported that understanding a patient's suffering through RP could improve the quality of medical students' patient care. Through a combination of outpatient encounters and medical student RP, they found that medical students realized outpatients' narratives better, while this was difficult to achieve using traditional educational strategies. In addition, critical thinking and communication skills training via RP are increasingly being used for

undergraduate medical education. Latif et al.<sup>16</sup> reported that RP enhanced the critical thinking of medical students in problem-based learning curriculums and improved their reflection on real life experiences. It has also been shown that RP enhances holistic patient care by improving communication skills and empathy.<sup>10</sup> Echoing these aforementioned studies, our data showed that medical students who actively engaged in RP, improved their counselling skills and overall capabilities. These highly motivated students were likely to spend more time interviewing patients and taking the patients' perspective into consideration. Therefore, the students who role-played the patients benefited more from the "Give Me Five" interactive training than the non-RP students. This study confirmed that the interactive "Give Me Five" training program could improve the attendees' clinical performance. Notably, medical students who engaged in RP

had significantly improved clinical performance compared with those not engaging in RP.

Some limitations of the present study should be addressed. First, the validity of the mini-CEX evaluation of clinical performance remains debated,<sup>17</sup> thus the mini-CEX scores should be carefully interpreted in the study. We assigned the same rater to perform the pre- and post-training mini-CEX tests to avoid any inter-rater variation, but intra-rater variation may exist. Second, the medical students who rotated to the Division of General Medicine received training not only by “Give Me Five” but also by other methods, including teaching rounds, lectures and medical recording, and clinical skills training. Therefore, the post-training mini-CEX scores may also reflect the teaching efficacy of the overall program of general medicine. Nevertheless, RP was still a valid determinant that differentiated the two groups of medical students, since they all received the other training methods without distinction. Finally, the non-RP students might be less motivated, which could contribute to their lower mini-CEX scores. It might be doubt to raise the bias of using mini-CEX to evaluate their clinical performances. However, considering the nature of this interactive method and the main theme of this study, we allowed the students’ to choose their group rather than randomly allocating them to take RP. Furthermore, the raters were not aware of whether the evaluated students were in the RP or non-RP group. Therefore, selection bias was limited.

In conclusion, our data showed that RP of real patients in the interactive “Give Me Five” clinical reasoning training improved medical students’ clinical performance. Those who actively performed the RP of real patients benefited more than those who did not. Thus, encouraging medical students to empathetically portray patients can help them to become a more competent clinician in the future. Nevertheless, whether the improvement in clinical performance of medical students is durable remains unknown. The follow-up study on the students’ performance after graduation is warranted to be performed.

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