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# Exploring effective video-review strategies of patient encounters for medical students: precepted review versus peer discussion

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## ABSTRACT

**Background:** Video-recordings review of patient encounters is reported to improve the clinical performance of medical students. However, evidence on specific remediation strategies or outcomes are lacking. We aimed to implement videorecording-based remediation of standardized patient encounters among medical students, combined with preceptor one-on-one feedback or peer group discussion, and evaluate the effectiveness of the two remediation methods using objective structured clinical examination (OSCE).

**Methods:** Following standardized patient encounters, 107 final-year medical students were divided into two groups based on different remediation methods of video review: (1) precepted video review with preceptor feedback ( $N = 55$ ) and (2) private video review and subsequent peer group discussion under supervision ( $N = 52$ ). All students underwent twelve-stations of OSCE both before and after the video review. Students' pre- and post-remediation OSCE scores, self-efficacy level in patient encounters, and level of educational satisfaction with each method were assessed and compared between different video-based remediation methods to evaluate their respective effects.

**Results:** After remediation, the total and subcomponent OSCE scores, such as history taking, physical examination, and patient – physician interaction (PPI), among all students increased significantly. Post-remediation OSCE scores showed no significant difference between two remediation methods (preceptor module,  $79.6 \pm 4.3$  vs. peer module,  $79.4 \pm 3.8$  in the total OSCE score). Students' self-efficacy levels increased after remediation in both modules (both  $p$ -value  $< 0.001$ ), with no difference between the two modules. However, students' satisfaction level was higher in the preceptor module than in the peer module ( $80.1 \pm 17.7$  vs.  $59.2 \pm 25.1$ ,  $p$ -value  $< 0.001$ ). Among students with poor baseline OSCE performance, a prominent increase in PPI scores was observed in the preceptor-based module.

**Conclusion:** Video-based remediation of patient encounters, either through preceptor review with one-on-one feedback or through private review with peer discussion, was equally effective in improving the OSCE scores and self-efficacy levels of medical students. Underperforming students can benefit from precepted video reviews for building PPI.

## ARTICLE HISTORY

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Feedback; objective structured clinical examination; peer; preceptor; remediation; video



## Introduction

Objective structured clinical examinations (OSCEs) are widely used to assess medical students' skills in areas such as history taking, physical examination, and communication skills [1]. When used as a formative assessment tool, OSCEs provide students with a unique learning experience and enable them to reflect on their clinical competence [2]. Particularly, formative OSCEs for final-year medical students help identify and improve their clinical competencies and deficiencies in preparation for graduation and the achievement of a medical license [3,4].

Examinees usually undergo self-assessment and motivational remedial processes after OSCEs [5]. In particular, the educational value of OSCEs can be maximized

when appropriate external feedback is given with OSCEs, as students' clinical skill achievement occurs more quickly [5]. External feedback plays an important role in facilitating and monitoring student self-learning [6,7]. Furthermore, when accompanied using video recordings of their patient encounters, students are much more likely to engage with the feedback [6–10].

Looking at their own video recordings of patient encounters and engaging in self-reflection have been reported to have a significant remedial effect [7,11]. Among the various approaches that have been used for video-based remediation for medical students, considerable variation exists in the study design, number of medical students involved, video-review method, and outcomes assessed. One study highlighted the positive effect of watching video recordings of patient encounters

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on engaging students at a deep cognitive level, either through peer discussions or peer feedback [8]. Another study showed that video-based reviews with preceptor feedback were more learner-centered and addressed communication and professionalism issues than immediate feedback following direct observation [12]. However, previous studies on video-based remediation have had small sample sizes of students resulting in the suboptimal outcomes of video-based remediation, limited to review of failing OSCE stations [7,9,10,12], have primarily focused on qualitative aspects as outcomes of remediation rather than objective and quantitative measurements [8,13], or have examined the effectiveness of video-based reviews without providing specific strategies in detail [12,14]. Indeed, there is still a lack of research on detailed strategies for video-based remediation, i.e., the use of self-feedback diaries or peer discussion. The self-feedback diaries encourage students to actively reflect on their learning experiences, while peer discussion offer interactive learning environment between fellow students, reinforcing their understanding through collaboration. Nonetheless, limited evidence on this issue urges the establishment of a basis for implementing video-based remediation and outcome assessment in a different educational setting. We designed two strategies for video-based remediation, that is, preceptor one-on-one feedback versus self-assessment of videos combined with peer discussion under supervision, for final-year medical students. As preceptor involvement is considered an authentic and resource-intensive method of remediation [6], we designed video-based remediation combined with peer discussion under supervision, rather than relying solely on private reviews of the video by individuals. We then examined the effects of the two methods on formative OSCE scores, students' self-efficacy in patient encounters, and educational satisfaction [6].

## Methods

### Study participants

A total of 109 fourth-year medical students from a single medical school in Korea participated in this

study. As presented in Figure 1, the students were scheduled to undergo an eighteen-week clinical clerkship rotation, with the department rotating every one to two weeks. For the clerkship, the students were divided into 14 small groups with six to eight students in each group. A remediation intervention following the two OSCE stations was implemented during a 1-week Community Medicine clerkship program. All students provided informed consent before being randomly assigned to one of two groups: (1) precepted video-based review (preceptor feedback group) or (2) video-based review with peer discussion under supervision (peer discussion group). Randomization was conducted based on the order of clinical clerkship rotation. A random number-generating function in Microsoft Excel was used to assign each clerkship group a random number. These numbers were then sorted in ascending order, and participants were allocated to one of the two intervention groups based on this sorted order. To achieve a statistical power of 0.8, a minimum sample size of 73 participants was required, based on an effect size of 0.15 from a previous study [9].

### *Video-based remediation either with one-on-one preceptor feedback or peer discussion*

Table 1 presents the specific details of the video-based remediation based on one-on-one preceptor feedback and peer discussion. All students participated in a two-station OSCE, 'feeling dizziness' and 'indigestion,' each for 12 minutes. All standardized patient (SP) encounters were recorded on video, and after each station, preceptors provided five minutes of one-on-one direct oral feedback to the examinee students.

Video recordings were watched on the day following the OSCE. Students in the preceptor feedback group watched their videos accompanied with a preceptor (Faculty of Medicine). Students were instructed to write a self-feedback diary, reflect on their emotions while watching the recordings, and identify their strengths and areas for improvement in medical interview, physical examination, and patient – physician relationship building skills. After

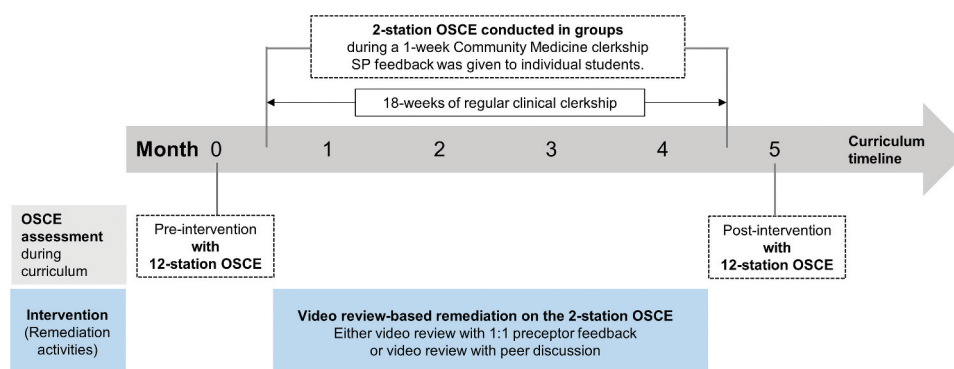


Figure 1. Study flow.

**Table 1.** Details of video-based remediation methods either with one-on-one preceptor feedback or peer discussion.

	Preceptor feedback group (Video-based remediation with one-on-one preceptor feedback)	Peer discussion group (Video-based remediation with peer discussion)
Assessment	2-station of OSCE followed by feedback from standardized patients	
	<ul style="list-style-type: none"> <li>– Watch the first video recording with the preceptor (12 min)</li> <li>– Write in the self-feedback diary</li> <li>– Provided oral feedback from the preceptor (5 min)</li> </ul>	<ul style="list-style-type: none"> <li>– Watch the first video recording on their own (12 min)</li> <li>– Write in the self-feedback diary</li> <li>– Watch the second video recording on their own (12 min)</li> </ul>
Remediation	<ul style="list-style-type: none"> <li>– Watch the second video recording with the preceptor (12 min)</li> <li>– Write in the self-feedback diary</li> <li>– Provided oral feedback from the preceptor (5 min)</li> <li>– Summative oral feedback from the preceptor (5 min)</li> </ul>	<ul style="list-style-type: none"> <li>– Write in the self-feedback diary</li> <li>– Peer discussion under the preceptor supervision (30 min)</li> <li>– Write about the group discussion in the diary</li> </ul>

completing the video review, the preceptor provided oral feedback based on a predetermined feedback template with a particular focus on communication and interpersonal skills (Table 2). Summative oral feedback was provided at the end of the remediation.

In the peer discussion group, the students watched their recorded videos individually in a private room. Similar to the preceptor feedback group, they were required to write a self-feedback diary reflecting their observations. Following the video review, the students engaged in a 30-minute peer group discussion. During the discussions, they shared their reflections on their interviews, discussed the feedback they had received from the SPs the previous day, and addressed any questions related to their clinical interview skills, physical examination skills, or OSCEs. A facilitator was selected based on the experience in medical education and prior involvement in similar educational interventions. One faculty member from the Department of Family Medicine served as

a facilitator for the group discussion, intervening only when the discussion encountered obstacles or when active communication was required.

### *Pre- and post-remediation measurement*

All fourth-year medical students completed the twelve-station OSCE before starting regular clinical training, and this score was used as their baseline clinical performance skills. After completing the clerkship rotation, all the students underwent another twelve-station formative OSCE assessment. The post-clerkship OSCE assessment score was considered the post-intervention OSCE score. Each station involved twelve-minutes of SP encounters. The scenarios and marking schemes for each OSCE station were developed and agreed upon by local experts, and the face validity was evaluated by the panel involved in creating the stations. The total OSCE score encompasses five components: history taking, physical examination,

**Table 2.** Details of preceptor feedback template.

Areas of feedback (communication and interpersonal skill)	Details of feedback
The student doctor listened to the patient enough and asked questions effectively.	<ul style="list-style-type: none"> <li>Appropriately used both open-ended questions and close-ended questions</li> <li>Avoided replicated questions</li> <li>Listened courteously</li> <li>Allocated the interview time appropriately</li> <li>Summarized conversations occasionally, giving direction to the interview</li> <li>Asked questions with clinical reasoning without superficial search-and-scan</li> </ul>
The student doctor explored not only the disease but also the illness experience while paying attention to the life of the patient itself	<ul style="list-style-type: none"> <li>Explored ideas and feelings for symptoms of the patient</li> <li>Encouraged the patient to express emotions and feelings</li> <li>Explored the expectations of the patient</li> <li>Explored the effects of symptoms on daily function</li> <li>Expressed empathy and support for the patient</li> </ul>
The student doctor gave explanations that are easy to understand and remember for the patient.	<ul style="list-style-type: none"> <li>Did not use medical jargon or thoroughly explained when jargon was unavoidable</li> <li>Considered the patient's opinion and their right of choice</li> <li>Checked for understanding, gave chances to ask questions</li> <li>Explained with scientific grounds</li> </ul>
The student doctor created a good relationship with the patient.	<ul style="list-style-type: none"> <li>Relaxed the patient starting the first conversation lightly</li> <li>Encouraged the patient to speak as needed</li> <li>Conveyed authenticity</li> <li>Appeared professionally confident, trustworthy, and knowledgeable as experts</li> <li>Spoke with appropriate volume, tone, and clear pronunciation</li> </ul>
The student doctor treated the patient respectfully with courtesy.	<ul style="list-style-type: none"> <li>Hand hygiene</li> <li>Consideration of patient safety and discomfort</li> <li>Explained about the physical examination beforehand and thoroughly explained the physical findings</li> </ul>

clinical courtesy, patient education, and patient – physician interaction. At both pre- and post-intervention assessment stages, students' self-efficacy levels regarding clinical encounters were assessed using a self-administered questionnaire on a ten-point Likert scale ranging from 1 (extremely unconfident) to 10 (extremely confident). In addition, the satisfaction levels with each remediation method were assessed after remediation.

### Statistical analysis

The mean scores for the twelve-station OSCE before and after the intervention were compared using a paired-sample t-test to assess the impact of video-based remediation on the total participant group. Additionally, the total and subcomponent OSCE scores as well as self-efficacy levels were compared between different video-based remediation methods to evaluate their respective effects. In the subgroup analysis, students with baseline OSCE scores below one standard deviation were identified as the low-performance group ( $N=20$ ), and changes in their OSCE scores based on the remediation method were analyzed using the Wilcoxon signed-rank test. A between-group coefficient comparison (z-test) was conducted to examine whether there was a difference in the slopes of the pre- and post-remediation OSCE scores between the two groups. All statistical analyses were conducted using SPSS software (version 25.0; SPSS Inc., Chicago, IL, USA). Statistical significance was set at  $p < 0.05$ .

### Results

After the remediation, the average OSCE score of the students increased from  $74.9 \pm 4.9$  to  $79.5 \pm 4.1$  (Table 3). There was a significant improvement in the subcomponent OSCE scores, including history taking, physical examination, patient education, clinical courtesy, and patient – physician interaction ( $p < 0.01$ ). The students' self-efficacy on medical interviews increased from  $59.2 \pm 17.2$  to  $71.2 \pm 17.8$  after the remediation.

Table 4 compares the preceptor feedback and peer discussion groups in terms of pre- and post-OSCE scores, self-efficacy, and educational satisfaction. Both the preceptor feedback and peer discussion groups exhibited increased post-remediation OSCE scores for total score, physical examination, patient education, clinical courtesy, and patient – physician interaction. History taking showed increased post-remediation score for peer discussion group only. However, there were no significant differences in the post-remediation OSCE scores between the two groups. Both groups showed a significant increase in self-efficacy levels after video-based remediation ( $p < 0.001$ ), but there was no significant difference in self-efficacy levels after the remediation between the two groups ( $73.5 \pm 19.2$  in the preceptor feedback group vs.  $69.0 \pm 16.2$  in the peer discussion group;  $p = 0.200$ ). However, regarding educational satisfaction, the preceptor feedback group reported significantly higher satisfaction levels ( $80.1 \pm 17.7$ ) compared with the peer discussion group ( $59.2 \pm 25.1$ ;  $p < 0.001$ ).

Figure 2 shows the mean change in the total and subcomponent OSCE scores according to remediation among all students and underperforming students. Students with poor baseline performance, defined as those with baseline OSCE scores below one standard deviation, had an average total OSCE score of 67.3, whereas the overall student average was 75 (out of 100). These students showed significant improvements in the total and subcomponent OSCE scores, regardless of the remediation method. Particularly, the scores of clinical courtesy and patient – physician interactions increased notably. However, there were no significant differences in either the post-remediation scores or the slopes of the score changes between the groups.

### Discussion

This study conducted video-based remediation of the standardized patient encounter for final-year medical students and evaluated the effects of two different strategies: precepted review with one-on-one feedback and peer group discussion. Both the precepted feedback and peer discussion methods resulted in

**Table 3.** Comparison of twelve-station OSCE scores before and after remediation among all participants ( $N = 107$ ).

	Pre-remediation (baseline)	After remediation	P-value <sup>a</sup>
OSCE total score	$74.9 \pm 4.9$	$79.5 \pm 4.1$	<0.001
OSCE subcomponent			
History taking	$74.9 \pm 5.7$	$76.2 \pm 5.1$	0.004
Physical examination	$53.9 \pm 7.8$	$67.1 \pm 7.8$	<0.001
Patient education	$75.1 \pm 7.3$	$88.9 \pm 6.3$	<0.001
Clinical courtesy	$89.5 \pm 6.0$	$94.5 \pm 4.2$	<0.001
Patient–physician interaction	$79.5 \pm 7.1$	$82.4 \pm 6.4$	<0.001
Self-efficacy level	$59.2 \pm 17.2$	$71.2 \pm 17.8$	<0.001

<sup>a</sup>Paired sample t-test.

Abbreviations: OSCE, objective structured clinical examination.

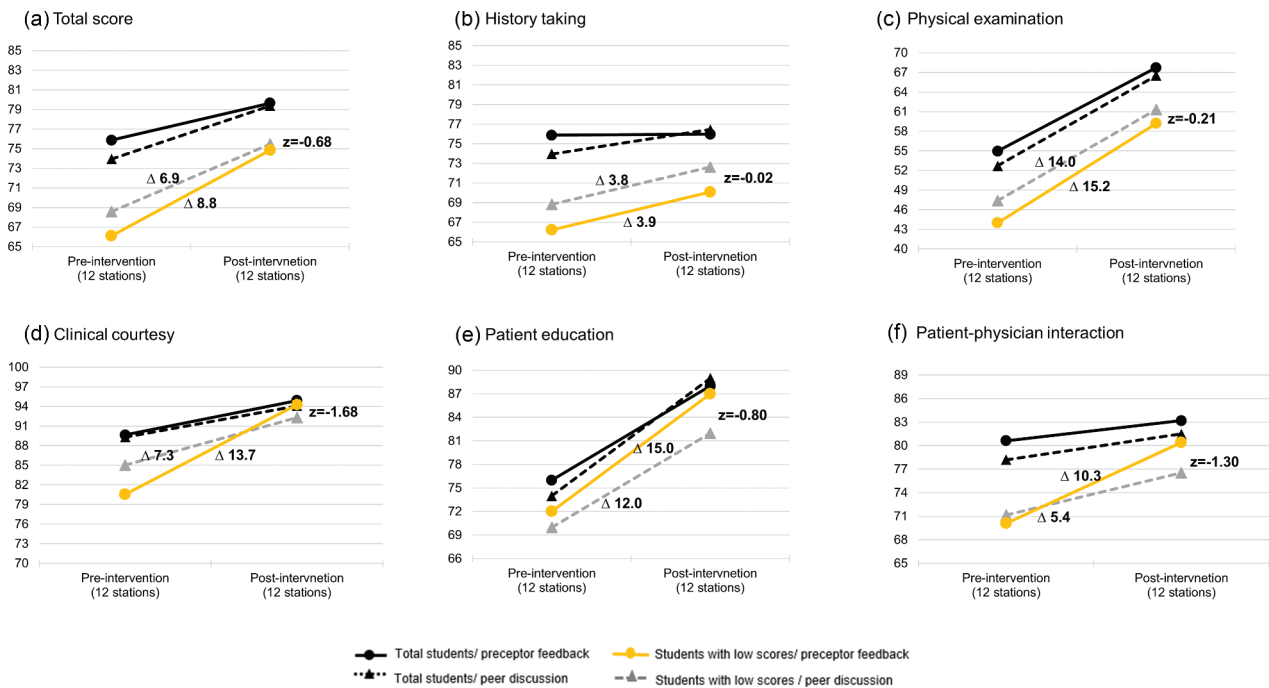
**Table 4.** Effect of each remediation method on OSCE scores and self-efficacy levels along with students' satisfaction level in each remediation group.

	Preceptor group (N = 55)			Peer group (N = 52)			P-value <sup>b</sup>
	Baseline	After remediation	P-value <sup>a</sup>	Baseline	After remediation	P-value <sup>a</sup>	
12-station OSCE							
History taking	75.9 ± 6.2	76.0 ± 5.4	0.860	74.0 ± 5.0	76.5 ± 4.7	<0.001	0.811
Physical examination	55.0 ± 8.2	67.7 ± 7.9	<0.001	52.7 ± 7.2	66.5 ± 7.8	<0.001	0.343
Patient education	76.3 ± 7.5	88.4 ± 6.2	<0.001	73.8 ± 7.0	89.3 ± 6.5	<0.001	0.758
Clinical courtesy	89.6 ± 6.2	94.9 ± 4.1	<0.001	89.3 ± 5.8	94.1 ± 4.4	<0.001	0.2
Patient – physician interaction	80.6 ± 7.4	83.2 ± 6.1	0.002	78.2 ± 6.7	81.5 ± 6.5	<0.001	0.091
Total score	75.9 ± 5.5	79.6 ± 4.3	<0.001	73.9 ± 4.0	79.4 ± 3.8	<0.001	0.504
Self-efficacy level (range 0–100)	60.8 ± 18.8	73.5 ± 19.2	<0.001	57.5 ± 15.5	69.0 ± 16.2	<0.001	0.200
Satisfaction level on each method (range 0–100)		80.1 ± 17.7			59.2 ± 25.1		<0.001

<sup>a</sup>P-value by paired sample t-test within each group.

<sup>b</sup>P-value by independent t-test for post-remediation OSCE, post-remediation self-efficacy, and satisfaction scores for remediation methods between the two groups.

Abbreviations: OSCE, objective structured clinical examination.



**Figure 2.** Mean change of the total and subcomponent OSCE scores according to remediation among all students and underperforming students (solid black line with circles: all students receiving preceptor feedback; dashed black line with triangles: all students participating in peer discussion; solid yellow line with circles: students with low scores receiving preceptor feedback; dashed gray line with triangles: students with low scores participating in peer discussion). The comparison of group coefficients (z) did not yield any significant results as none of the z-values exceeded 1.96, which is considered significant at the  $p < 0.05$ . Abbreviations: OSCE, objective structured clinical examination.

equal improvement in total and all subcomponent OSCE scores as well as in their self-efficacy for clinical interview. However, among students with poor performance, the preceptor feedback module substantially improved patient – physician interaction scores compared with the peer discussion module. Overall, the students reported higher educational satisfaction with the preceptor feedback module than with the peer discussion module.

Video recordings of patient encounters provide interviewers with the unique experience of seeing themselves through a third eye. Video-based remediation encourages individuals to evaluate their own performance and actively engage in problem-solving

[9,15,16]. This approach can facilitate the skills for clinical reasoning, communication, and discussion on professionalism under the guidance of faculty supervisors or independently [9,10,12]. In one study, delayed self-video watching after one month of an OSCE proved to be more effective than immediate examiner feedback [10]. Therefore, video recordings and self-reflection must be actively incorporated into OSCE remediation, as it is easy to implement and straightforward once the required infrastructure is established.

Regardless of whether or not employing resource-intensive educational methods such as faculty video-watching and one-on-one feedback provision, similar

levels of positive effects on OSCE scores were observed in both interventions. This can be partially attributed to the study design, in which all students received oral feedback from the SP immediately after the encounter. External feedback is known to be most effective when it occurs immediately after a patient encounter [17–19]. Furthermore, the feedback's effectiveness depends on its specificity and credibility [20,21]. In this study, the SPs had extensive work experience, enabling them to provide well-rounded educational feedback. Overall, the combined impact of SP feedback and video-based reviews surpassed the effectiveness of specific remediation activities.

Peer teaching is increasingly being acknowledged as an effective learning method in medical education [22–24]. Our findings suggest that faculty feedback may not always be necessary for student remediation if additional activities such as peer discussion are included [25,26]. We employed an approach of indirect peer feedback in the remediation; that is, students watched only their own videos, and peer feedback was provided based on sharing their video-watching experience. Most previous studies have demonstrated the effectiveness of watching videos of peers who demonstrate superior performance and receive feedback [8]. Effective remediation often requires the integration of multiple approaches and expanding the use of peers as assessors and feedback providers is a valuable strategy [27,28].

However, among students with low performance, the group that received preceptor feedback demonstrated a pronounced improvement in their patient – physician interaction scores. This finding aligns with previous studies that emphasized the importance of precepted video reviews as a valuable remediation method for failing students [7,29]. A precepted video review provides underperforming students with an opportunity to enhance their understanding of the factors that contribute to their shortcomings [6,12]. A crucial aspect of successful remediation is motivating students to concentrate their efforts on improving their weak areas while developing a clear understanding of the context [30]. Our findings underscore the need to develop resource-efficient remediation strategies tailored to the specific needs of diverse individuals, particularly in situations where faculty availability for remediation and individual one-on-one meetings with students are limited.

The overall satisfaction level of the precepted video review group was significantly higher than that of the peer discussion group. Faculty attention is considered a key strength in faculty-engaged remediation education [31,32]. As remediation can have a great impact on learners in an individualized and highly interactive setting, watching self-videos with faculty members promotes high concentration and effective self-reflection. A high level of satisfaction with educational experiences

can enhance learners' self-confidence and motivation [33]. This enables learners to acquire and apply new knowledge and skills while addressing areas needing improvement [34]. This can contribute to enhancing clinical competence in real-world settings, which is the ultimate goal of OSCE remediation. However, as we did not evaluate the long-term effect of remediation, such as students' clinical competence at the postgraduate level, further research is needed to explore the retention effect of specific remediation strategies.

Our study has several limitations. First, the clinical clerkship rotation was administered to all participants between the pre- and post-remediation twelve-station OSCE, which means that the observed increase in OSCE scores could be influenced by both the natural maturation of students and the effect of remediation. Additionally, group remediation sessions were conducted sequentially over an 18-week clinical clerkship period. This may have resulted in variations in skill improvement depending on the timing and students' cumulative learning experiences. Second, the students' relatively high baseline OSCE scores make it challenging to assess the educational impact of remediation based solely on post-intervention OSCE scores. Third, the use of a single preceptor feedback provider may have influenced the results. The effectiveness of feedback is influenced by various factors, including the tutor's profile, such as level of experience, sex, and specialization [35,36], which can affect the degree of interaction between the tutor and the student. Nevertheless, standardized feedback based on a predetermined template was consistently applied to overcome this issue. Finally, there is a limitation regarding the transferability of the remediation effect, as we did not compare students' clinical performances in an actual clinical setting. Future studies should assess improvement in work-based clinical competency, which is the ultimate objective of remediation. Despite these limitations, our study has designed and implemented two of the most authentic and widely used video-based remediation methods: preceptor feedback-based video reviews and video-based remediation using peer discussion. We conducted an objective and quantitative comparison of the effects of each remediation method using a twelve-station OSCE, known for its high validity and reliability.

In conclusion, this study adds to the existing body of knowledge on video-based remediation by providing detailed implementation and comparative results of two video-based remediation methods: preceptor feedback and peer discussion. Peer discussion following individual video review can be a valuable tool, especially in resource-limited settings, but preceptor-led video review needs to be prioritized for students requiring more intensive

remediation. Immediate SP feedback appears to have a significant impact on performance, and we suggest incorporating video review and the use of a self-feedback diary to ensure the effectiveness of remediation. Ultimately, it is essential to develop resource-efficient strategies that can be tailored to individual student needs. This includes ensuring the availability of trained faculty for one-on-one video-review sessions, even if limited, and utilizing peer feedback to supplement these efforts. Future research should focus on the long-term impact of these remediation strategies on clinical competence in real-world settings, to ensure that medical education continues to meet the needs of diverse learners.

### Ethics approval and consent

This study was approved by the Institutional Review Board of the Human Subjects Research and the Ethics Committee of Hanyang University Hospital (HYUH 2022-08-050). Written informed consent was obtained from all subjects.

### Availability of data and materials

The datasets and materials can be obtained from the corresponding author upon reasonable request.

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### Disclosure statement

No potential conflict of interest was reported by the author(s).

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