Effectiveness of a simulated patient training programme based on trainee response accuracy and appropriateness of feedback

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Abstract

Introduction: Simulated patients (SPs) need education and training in required skills to be effective resources in education. This study was conducted to examine the effectiveness of an SP training programme based on the accuracy of trainee responses and the appropriateness of their feedback.

Methods: Thirty-two applicants to the training programme and 35 experienced SPs were included in this study. The experienced SPs served as a reference group. The rate of accurate responses and the rate of appropriate feedback were assessed with pre- and post-training tests, and these two outcome measures were compared with those of the experienced SPs.

Results: No significant differences were found in trainee response accuracy or appropriateness of feedback between pre- and post-training tests. The response accuracy rate of the trainees on the pre-training test was significantly lower than that of SPs with 1–2 years of experience, whilst there was no significant difference between these SPs and the trainees on the post-training test.

Conclusions: Although our study suggests that more training is needed to improve the skills of SPs, the training programme may contribute to helping trainees reach a novice level in the skill of providing accurate responses. SP training should be encouraged to contribute to the effectiveness of such teaching and to establish the validity of the assessment.

Introduction

As the first report by Barrows and Abrahamson (1), simulated patients (SPs) have increasingly been used in healthcare education (2). In dentistry, SPs were first used in assessment (3) and later in teaching (4). SPs have been incorporated in objective structured clinical examinations (OSCEs) in European countries, the USA and Japan (5–8).

European and Asian educators use the term 'simulated patients' to refer generally to both simulated and standardised patients, whereas in the USA, simulated and standardised patients are classified together as 'standardised patients' (9). SPs are often distinguished from standardised patients, with standardised patients mainly used for assessment and expected to give consistent responses in a standardised way, whilst SPs are mainly used for teaching. The manner in which SPs provide

information depends on the encounter situation between the patient and the health provider. To avoid confusion, we will refer to SPs as a general term that includes both simulated and standardised patients throughout the paper and will make it clear when we mean one type specifically.

SPs need training in required skills to be effective resources in education. Although a detailed procedure for training SPs has been described by Wallace (10), studies on systematic training programmes for SPs are rare (11, 12). In addition, the existing literature lacks studies about SP training, and very few studies have assessed changes in SP performance as an outcome measure (13).

When SPs are used for examinations, especially for formal examinations such as OSCEs, it is critical for standardised patients to respond to questions with standardised, contextualised and accurate responses, which are not necessarily means verbatim predetermined responses, but convey the same meaning. In the context of teaching, the feedback provided by SPs is valuable for the learners and the quality of the feedback contributes to the efficacy of the teaching. Existing literature suggests that feedback should be specific and descriptive, with examples of what happened and a focus on observable behaviour (14), that feedback should be provided about how the consultation felt to the SP (15) and that it should be provided from the patient's perspective (10, 16). The objective of this study was to examine the effectiveness of the SP training programme based on two outcome measures: the accuracy of trainees' responses and the appropriateness of feedback.

Methods

The training programme

The training programme (Fig. 1) consisted of six 2.5-hour sessions plus observation of real SPs acting in an educational institute.

The goals of the programme were to help trainees understand the background of SPs (session 1), understand interpersonal communication (session 2), familiarise themselves with the portrayal of SP's role (session 3), understand how to give a response as a standardised patient and how to standardise the presentation of their role (session 4), understand how to memorise the scenario of a simulated patient and to create the role of a simulated patient (session 5) and understand what constitutes effective feedback (session 6).

Sessions were delivered 1 month apart, and the complete programme took approximately 6 months to finish. Sessions 3, 4 and 5 had medical and/or dental components. Because the trainees were laypeople with no knowledge of what SPs were, the programme started with lectures to impart that knowledge and then proceeded to a role-playing exercise designed to improve their performance.

In session 1, trainees learned about the use of SPs in health education, including the history of SP utilisation, the reasons SPs are so important in health education and the role of SPs.

In session 2, trainees were taught about interpersonal communication and played a message game. They were instructed to interpret a picture and to describe it to another person using only words and no gestures. After the game, the trainees reported how they felt during the game and why. This activity was conducted particularly to make the trainee aware of the role of non-verbal as well as verbal communication and how given information affects one's perception.

Trainees practised portraying the role of SPs in session 3. On a separate occasion after session 3, trainees observed current SPs acting in a medical interviewing class at an educational institute.

In sessions 4 and 5, trainees portrayed the roles of standardised patients and simulated patients. After acting, the trainees performed self-evaluations, such as what role was difficult for them to play and what they should do to improve their role-playing. At the end of each session, the trainees observed the

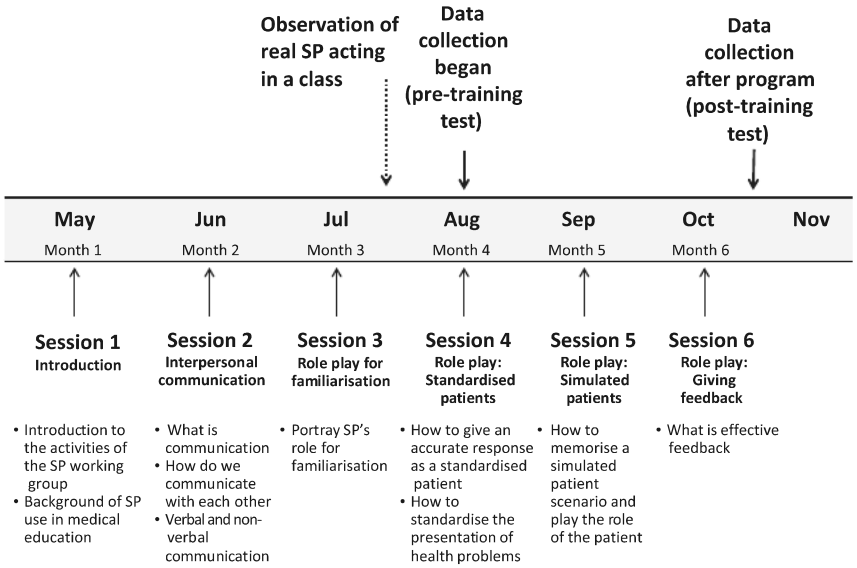

Fig. 1. Timeline of the training programme.

acting of a current SP. The trainees also received a lecture that focused on the difference between a standardised and simulated patient.

In session 6, trainees played the role of a simulated patient and gave oral feedback to the person playing the role of doctor or dentist. They then received comments on their own feedback from the SP educators as well as from experienced SPs. Finally, trainees observed real simulated patient acting and SP feedback, and received a lecture on SP feedback.

Of 32 eligible trainees, 24 participated in both dental and medical training (sessions 3–5). Trainees performed the role-play seven times (twice for familiarisation, twice as standardised patients and three times as simulated patients), if they participated in both medical and dental parts at all sessions. In session 4, trainees role-played standardised patients, and in sessions 5 and 6, they played simulated patients. Overall, 17% of the trainees (5/30) had no practice playing a standardised patient to improve their response accuracy, and 83% (25/30) practised only once. Nineteen per cent of trainees (6/32) performed the role of simulated patient and the feedback exercise twice, and 81% (26/32) performed the role three times.

The training programme was implemented four times from 2007 to 2009. Each participant attended one of the four training programmes.

Study design

This study design was a pre-/post-evaluation. The pre-training test was performed during session 4 because the trainees initially did not know how to portray SPs. The initial data were obtained after the trainees had experienced a role-playing exercise. The role-play in session 4 served as data collection and as part of the training session itself. The post-test was administered immediately after completion of the programme (Fig. 1). Experienced SPs served as a reference group.

Subjects

Applicants of the training programme

The training programme trainees were recruited via advertisements in local newspapers and by experienced SPs. Of the 48 applicants, 32 (25 females and 7 males) who completed at least five required programme sessions (from sessions 2 to 6; sessions 3, 4 and 5 have medical and/or dental components and trainees should take either of the two) and who took the final evaluation after the programme were eligible to participate in the study (Fig. 1).

Experienced SPs

Experienced SPs were recruited from SP working groups. Thirty-five SPs (27 females and 8 males) from five SP working groups participated in the study. The mean length of SP experience was 5.2 years (SD = 4.0, range = 1.0–20.0 year.). Ten of the experienced SPs (28.6%) had 1–2 years' experience. Nineteen of the experienced SPs (54%) had no experience of OSCEs in dentistry.

Data collection procedure

Trainees in the SP training programme

The pre- and post-training assessments were conducted using only the dental scenario. Trainees were assigned to one of five dental students or one dentist who played the role of a dentist. The trainees played the role of standardised patients and presented different dental cases during session 4 (Appendix A) and after completion of the training programme (Appendix B). The trainees' interviews were videotaped during data collection. After the interviews, the trainees were asked to write feedback about the interview and about how they felt during the encounter.

Experienced SPs

The experienced SPs were assigned to one of five dental students or one dentist who played the role of a dentist. They portrayed only the scenario presented to trainees after completion of the training programme (Appendix B). Interviews on these occasions were also videotaped. The rest of the data collection procedure was performed in the same manner as for trainees. The data from each SP group were collected separately on different days and each group took 1 or 2 days over a 2-year collection period.

SP portrayal standardisation

A detailed description of the scenario with standard and contextualised responses to the dentist's questions was given to the SPs beforehand and verbally explained. Questions pertaining to the scenario were answered before data collection.

Dentist performances

The people who played the role of dentist were trained to ask at least 19 predetermined key point questions (Appendix C and D).

Statistical procedures

The two outcome measures, the rate of accurate response and the rate of appropriate feedback, were compared for pre- and post-training tests. The trainees' scores on pre- and post-training tests were compared with those of experienced SPs.

Analysis

Scoring

Response accuracy: Thirty-seven standardised clinical features in the expected standardised patient responses were analysed, corresponding to the 19 key questions (Appendix C and D). The standardised patient responses were scored as either correct or incorrect. When standardised patients provided clinical features in response to the appropriate question posed by the dentist, the response was scored as correct. When standardised patients failed to give a clinical feature or gave a clinical feature

that was supposed to be provided in answer to another question, the response was scored as incorrect. If the dentist forgot to ask a question, so that the SP could not give the correct response, that response was not included in scoring. The total score was determined using 37 possible clinical features as the denominator and the number of the accurate clinical features as the numerator.

Appropriate feedback: Written feedback comments were divided into sentences. Each sentence was first coded into 11 categories and then further scored as appropriate or inappropriate by two evaluators. The categories of appropriate feedback comments were developed based on recommendations in the existing literature for providing effective feedback (10, 14–16) and modified by experienced SP educators (TY and KA).

Appropriate feedback comments were classified into three categories. Examples of each category are given in Table 1. These feedback comments should be made from the patient's perspective.

The appropriate feedback rate was calculated as the proportion of appropriate feedback comments. The total number of feedback comments was the denominator and the number of appropriate feedback comments was the numerator.

Inappropriate feedback: Inappropriate feedback comments were classified into eight categories based on the anecdotal findings in feedback training of SPs by experienced SP educators (TY and KA). The inappropriate feedback categories and examples of each category are given in Table 2.

Interevaluator reliability

Response accuracy: Two evaluators, a medical student and one of the authors (TY), individually scored responses using videotapes that were not included in this study. In cases of disagreement, the two evaluators discussed the scores until full agreement was reached. Each videotape in this study was scored independently by the two evaluators. Interevaluator reliability was calculated using kappa statistics and was excellent (Kappa = 0.895).

Appropriate feedback: Written feedback comments that were not included in this study were scored individually by two authors (TY and KA), who are both experienced SP educators. Interevaluator reliability was calculated in the same way as for response accuracy, and a substantial Kappa value (0.714) was obtained.

TABLE 1. Appropriate feedback categories and examples of each category

	Example
Specific dentist's behaviour and SP's interpretation/feeling.	'Because you summarised how my symptoms have changed at the end (specific dentist's behaviour), I could check whether there might be something I forgot to tell you (SP's interpretation) and I felt relieved (SP's feeling)'.
Specific dentist's attitude and SP's impression/feeling.	'You were very polite in speaking (dentist's attitude), and I felt you were a pleasant dentist (SP's impression/feeling)'.
Specific dentist's behaviour and SP's interpretation.	'Because your questions were brief and straight to the point (dentist's behaviour), they were easy to answer (SP's interpretation)'.

*These feedback comments should be made from the patient's perspective.

TABLE 2. Inappropriate feedback categories and examples of each category

Category	Example
Feedback comments about learner's behaviours not demonstrated in the encounter and that do not refer to the SP's feelings.	'I wish you (the learner) could have shown more sympathy'.
Feedback comments that do not conform to the learner's level of proficiency.	To a first-year student who has not learned about the proposed treatment plan: 'The explanation of the treatment plan was not clear, and I felt uneasy'.
Feedback comments comparing the learner's behaviour with that of others.	'The students who interacted last week were more skilful'.
Feedback comments regarding something the learner cannot change.	'I felt overwhelmed because you were too big'.
Generalised feedback comments that would be construed as representative of patients.	'Patients are always worried about their illness'.
Feedback comments related to incompetency in portraying the role.	'I'm sorry. I gave a wrong response to your question. The correct response should be …… in this role'.
Feedback comments from the facilitator's point of view.	'It was good that you made sure about the drug interaction'.
Feedback comments pointing out the learner's behaviour only or pointing out the SP's perception/feelings only.	'You nodded frequently'. 'I want to be treated by you (the learner)'.

Statistical analysis

Nonparametric methods were chosen because a normal distribution cannot be assumed for the population in this study. The Wilcoxon test was used to examine differences in the mean response accuracy rate and the mean rate of appropriate feedback on pre- and post-training tests. The Mann–Whitney test was used to compare the two outcome measures for trainees on pre- and post-training tests with those of the experienced SPs. These outcome measures results were also compared with those of experienced SPs with only 1–2 years' experience (n = 10) as a *post hoc* analysis using the Mann–Whitney test to examine the improvement in the trainees' skills. SPSS ver. 16.0 for Windows was employed for statistical analyses.

Ethics

All trainees and experienced SPs provided written informed consent after receiving an oral explanation and written documents explaining the study. The Research and Ethics Committee of Okayama University considered this study to be an educational activity that did not require approval.

Results

Comparisons of scores on pre- and post-training tests

Because of mechanical failure, two encounters in the training programme could not be videotaped. Therefore, the number of trainees included in the analysis of response accuracy was 30 (23 females and 7 males) instead of 32.

Table 3 and Table 4 show the individual data of response accuracy rate and appropriate feedback rate. Table 5 shows the mean response accuracy rate and Table 6 shows the mean appropriate feedback rate of the trainees on pre- and post-training tests, as well as the rates of SPs with 1–2 years' experience and of more experienced SPs. No significant improvements were observed between pre- and post-training tests in response accuracy (77.5%, 78.9%, respectively) or in appropriate feedback (73.4%, 82.5%, respectively; $P = 0.538$ and $P = 0.203$, respectively).

The large standard deviation in appropriate feedback in both the trainee group and experienced SP group indicates large variability in rates. Overall, 44% (14/32) of the trainees had a 100% appropriate feedback rate on the pre-training test and 63% (20/32) had a 100% appropriate feedback rate on the post-training test. The most frequent unsuitable feedback comments on the pre-training test (12 of 18 applicants) concerned their own incompetency in portraying the role. The most frequent unsuitable comments on the post-training test related to the perception or feelings of the SPs (6 of 12 trainees).

TABLE 3. Response accuracy rate of each individual trainees on pre- and post-training tests as well as those of SPs with 1–2 years of experience and of experienced SPs

Pre-training (n = 30) (%)	Post-training (n = 30) (%)	SPs with 1–2 years of experience (n = 10) (%)	Experienced SPs (n = 35) (%)
59.5	70.3	83.8	83.8
78.4	43.2	100.0	100.0
94.6	75.7	100.0	100.0
73.0	82.4	86.5	86.5
73.0	78.4	62.2	62.2
86.5	73.0	81.1	81.1
54.1	83.8	94.6	94.6
64.9	88.6	86.5	86.5
70.6	80.6	97.3	97.3
88.6	89.2	86.5	86.5
86.1	94.6		83.8
81.1	66.7		90.6
94.6	94.6		94.4
83.8	75.7		97.3
56.8	91.9		89.2
70.3	86.5		45.9
91.7	86.5		91.9
88.9	83.8		83.3
67.6	36.1		77.8
62.2	44.1		97.2
81.1	77.1		94.4
91.4	91.7		94.6
82.9	82.4		67.6
71.4	94.6		78.4
78.4	83.8		94.6
81.1	97.3		81.1
89.2	86.5		100.0
63.9	86.5		100.0
83.8	56.8		97.3
75.7	83.8		59.5
			100.0
			100.0
			100.0
			97.3
			100.0

TABLE 4. Appropriate feedback rate of each individual trainees on pre- and post-training tests as well as those of SPs with 1–2 years of experience and of experienced SPs

Pre-training (n = 32) (%)	Post-training (n = 32) (%)	SPs with 1–2 years of experience (n = 10) (%)	Experienced SPs (n = 35) (%)
33.3	100.0	100.0	100.0
0.0	0.0	100.0	100.0
33.3	100.0	100.0	100.0
0.0	100.0	75.0	75.0
75.0	25.0	33.3	33.3
66.7	100.0	0.0	0.0
100.0	100.0	100.0	100.0
50.0	66.7	83.3	83.3
100.0	100.0	66.7	66.7
66.7	66.7	100.0	100.0
66.7	100.0		100.0
100.0	100.0		75.0
50.0	100.0		100.0
80.0	75.0		100.0
100.0	100.0		75.0
100.0	100.0		100.0
75.0	80.0		0.0
66.7	57.1		66.7
40.0	100.0		100.0
100.0	100.0		100.0
80.0	57.1		100.0
100.0	100.0		100.0
100.0	40.0		100.0
100.0	80.0		100.0
100.0	100.0		66.7
100.0	66.7		80.0
50.0	100.0		100.0
50.0	100.0		100.0
66.7	100.0		100.0
100.0	100.0		83.3
100.0	25.0		50.0
100.0	100.0		100.0
			100.0
			83.3
			20.0

TABLE 5. Mean response accuracy rate of trainees on pre- and post-training tests as well as those of SPs with 1–2 years of experience and of experienced SPs

				Compared with SPs with 1–2 years of experience	Compared with experienced SPs
	Mean (%)	S.D.	Z-value *P*-value	U-value *P*-value	U-value *P*-value
Pre-training (n = 30)	77.5	11.5	Z = −0.616 P = 0.538	U = 73.5 P = 0.017	U = 238.5 P < 0.0001
Post-training (n = 30)	78.9	15.6		U = 91.0 P = 0.064	U = 289.0 P = 0.002
SPs with 1–2 years of experience (n = 10)	87.8	11.3			
Experienced SPs (n = 35)	88.4	13.1			

Comparisons between trainees and experienced SPs

The mean response accuracy rates of the trainees on the pre-training test (77.5%) and on the post-training test (78.9%) were significantly lower than that of the experienced SPs (88.4%; $P < 0.0001$ and $P = 0.002$, respectively). The mean response accuracy rate of the trainees on the pre-training test (77.5%) was significantly lower than that of the SPs with

TABLE 6. Mean rate of appropriate feedback on pre- and post-training tests as well as those of SPs with 1–2 years' experience and of experienced SPs

				Compared with SPs with 1–2 years of experience	Compared with experienced SPs
	Mean (%)	S.D.	Z-value *P*-value	U-value *P*-value	U-value *P*-value
Pre-test (n = 32)	73.4	29.8	Z = −1.272 P = 0.203	U = 146.5 P = 0.675	U = 455.5 P = 0.159
Post-test (n = 32)	82.5	27.5		U = 142.5 P = 0.560	U = 547.0 P = 0.854
SPs with 1–2 years of experience (n = 10)	75.8	34.3			
Experienced SPs (n = 35)	81.7	28.7			

1–2 years of experience (87.8%; P = 0.017), whilst there was no significant difference between the trainees' mean rate on the post-training test (78.9%) and that of the SPs with 1–2 years' experience (P = 0.064; Table 5).

With regard to the mean rate of appropriate feedback, there were no significant differences in the mean rate of appropriate feedback between the experienced SPs (81.7%) and the trainees on the pre-training test (73.4%) or the post-training test (82.5%; P = 0.159 and P = 0.854, respectively). The large standard deviation of appropriate feedback in both the trainee group and experienced SP group indicates large variability in the range of rates. No significant differences were found between the rates of SPs with 1–2 years of experience (75.8%) and those of trainees on the pre-training test or post-training test (P = 0.675 and P = 0.560, respectively; Table 6).

Overall, 57% of the experienced SPs (20/35) had a 100% appropriate feedback rate. The most frequent unsuitable feedback comments (12 of 15 trainees) regarded the learner's behaviours only or the SP's perception or feelings only.

Discussion

In this study, we attempted to examine a training programme for applicants to become SPs. Significant improvements between the pre-training and post-training rates were not observed. Also, there were no significant differences in the mean rate of appropriate feedback between the experienced SPs and the trainees on the pre-training test or the post-training test. However, the mean accurate response rate of the trainees on the pre-training test was significantly lower than that of SPs with 1–2 years of experience, whilst there was no significant difference between the trainees on the post-training test and the SPs with 1–2 years of experience. These results indicated that the trainees learned to improve their response accuracy to the novice level of SPs. Also, the large variability in rates of appropriate feedback especially suggested that some trainees learned, but some others did not.

One possible explanation of why significant improvements were not observed is that the number of role-playing exercise performances was not sufficient to show improvements between the two data-gathering occasions. With regard to feedback in particular, previous studies have suggested that giving feedback is one of the most difficult skills for SPs. It may therefore be unrealistic to expect an improvement in a relatively short period (17). Another explanation is that the feedback skill of the trainees at pre-training was sufficiently high that it left little room for improvement. This explanation is plausible, because no significant difference was found in the mean appropriate feedback rates between the experienced SPs and the trainees at pre-training. The instructional session before the pre-training test might have had an impact on the high appropriate feedback rate.

It was disappointing that only 57% of the experienced SPs had a 100% appropriate feedback rate. Our rating of the written feedback comments may have been too specific for the experienced SPs. Anecdotal findings suggest that the feedback of experienced SPs may be more global and that they may not be used to writing their feedback because oral feedback is more common than written feedback in Japan. Thus, the lack of difference between the experienced SPs and the trainee group may be because experienced SPs are not used to writing such specific feedback. Because of that, providing experienced SPs with subsequent opportunities to receive comments on their own feedback is strongly recommended especially for SPs whose scores were not sufficient enough. Additionally, 1-month intervals between training sessions might have resulted in less improvement compared with a more intense programme. However, we do not know if long intervals would have a negative or positive influence on the carry-over of trainees' skills.

Although significant improvements were not found, the SP training programme may help trainees reach the novice level in the skill of providing accurate responses. Existing studies report average accurate response rates of greater than about 90% for SPs (18–20). Although we do not know whether reported results are comparable to ours because of uncertainty regarding the complexity of the case scenario and the clinical features, the accurate response rate of the experienced SPs in our study was not low (88.4%). Therefore, it can be assumed that the skill of providing accurate responses can be learned by practice within a short period, and that practice is important for the accuracy of standardised patient responses, especially for an occasion like an OSCE.

Regarding feedback, more practice over a longer period seems to be required to improve the skill of providing feedback comments. Few studies have reported the use of written feedback comments in teaching (21, 22). To the best of our knowledge, only two studies on SP training have reported the use of a written feedback form to improve performance (13, 23).

No previous studies have analysed the appropriateness of written SP feedback comments. Other factors, such as age and gender, might contribute to the wide range of feedback rate.

Considering that some trainees had lower scores in the post-test, it is reasonable to conclude that the training programme, which we examined in this study, would be a preliminary programme to become an SP. A follow-up training is strongly recommended before the trainees can serve as SPs. Also, even after serving as SPs, it is important that individuals continue to receive comments on their own skills of providing accurate responses and appropriate feedback.

The concepts behind the training programme are observational learning and learning by practice and receiving feedback, allowing trainees to acquire the knowledge, skills and performance necessary to become an SP. Bandura's social learning theory postulates that behaviour is learned through observation and modelling (24). Feedback in a learning context can be defined as the interchange of information about a learner's performance, with the intention of minimising differences between the observed and desired performances (25). The power of feedback to improve teaching and learning is well documented (26). Allowing trainees to act as an SP by role-playing with immediate feedback and to observe experienced SP acting improved their skills and performance.

Limitations of this study include the lack of information regarding the age of the SPs, which might influence their memory. A control group should have been included to further improve the validity of the study. In addition, data from more subjects should have been collected. However, because the number of SP trainees was small, as was the budget for collecting data from experienced SPs, we could not collect more data. It should be noted that the outcome measures are newly developed and the validity of the outcome measures is not established, so that they could be insensitive to the changes we intend to measure. Also, the sample sizes are small, especially the number of SPs with 1–2 years of experiences, and given the large variation in response rates, this may lead to a lack of power in statistical test. Thus, it should be noted that these findings have limitations. Lastly, we did not calculate the effect size because we were unable to conduct a pilot study. Even if we conducted a pilot study, it would still have been difficult to recruit trainees.

In conclusion, SPs are a powerful resource for teaching and assessment. It can be harmful rather than beneficial if SPs are not appropriately trained. Although our study suggests that more training is needed to improve the skills of providing accurate responses and appropriate feedback comments, the programme may help trainees reach the novice level in the skill of providing accurate responses. This training programme can be used in other dental schools as example, but the criteria for the scoring need to be adapted.

Because the use of SPs is becoming more popular in teaching and assessment, SP training should be strongly encouraged to improve skills, SP training will eventually contribute to the effectiveness of dental education as well as the establishment of the reliability and validity of such assessments.

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Appendix A
Dental case scenario at pre-training test (session 4; female version)

History of present illness

For about 1 year, Mrs. Nagata had been complaining of a loose tooth, especially when she was tired, and had also been complaining of a dull pain in her lower left back tooth (second tooth from the back) during biting. It did not hurt when she had neither cold water nor hot water. She did not visit the dentist because the feeling of a loose tooth and dull pain disappeared when she was in good health. During biting, she felt a dull pain again for about 1 week. She thought that it would disappear when her health condition improved. However, she had spontaneous pain in the lower left back tooth after she took a bath last night. It hurts for about 1 h and then the pain disappeared. Consequently, she got to sleep last night. Since then, she has not felt any pain (right now). She has not taken any painkillers.

She decided to visit an outpatient clinic at Okayama University Hospital because she is afraid of being in pain again. Her children have been patients in this hospital and she feels familiarity with the staff, which made her to come to this hospital.

Patient's perspective towards the present problems

She believes that a bad health condition makes her less resistant to germs and viruses and therefore thinks that her recent poor health has brought about her present symptoms (feeling of a loose tooth and dull pain). She received a root canal treatment of the lower left back tooth about 3 years ago and thinks that her present problems would have an effect on this tooth.

She has no other problems in her mouth. She does not have any fear or anxiety about treatment and has had no bad treatment experiences.

Past dental and medical history

Mrs. Nagata received treatment (root canal treatment with local anaesthesia) of the lower left back tooth (second tooth from the back) at a nearby dentist about 3 years ago. Her treatment was covered by health insurance. The second tooth from the back is a prosthetic crown. She has not seen a dentist since then. She has never had a bad reaction during dental treatment.

About 3 months ago, she visited a doctor because she had a cold and was told that she had high blood pressure of 160 over 90. When she visited the doctor again, a medicine for high blood pressure was prescribed. Since then, she has taken one tablet of the medicine per day. Her blood pressure became normal (120 over 79) after taking the medicine. She has no allergies. She has never been hospitalised.

Oral health behaviour

She brushes her teeth twice a day, but does not know if her brushing is good enough.

Social history

She moved to Okayama from Kurashiki 2 years ago. Her husband was assigned to Mie last April and has lived there apart from her and the children. She goes back and forth between Mie and Okayama once a week to help him settle in. Owing to this, Ms. Nagata has felt tired, making her susceptible to the present problems. She can visit a dentist any time. She smokes and drinks a little.

Appendix B
Dental case scenario at post-training test (female version)

History of present illness

When Mrs. Yamamura had treatment for a cavity about 2 years ago, she was told that her upper left back tooth had periodontal disease and needed treatment. However, after the cavity was fixed, she did not go to a dentist for periodontal treatment.

For about 1 year, she had a feeling of a loose upper left back tooth when she was tired or her health condition was not good. She had also often seen bleeding around the upper left back tooth when she brushed her teeth. As she felt dull pain as well as swelling around her upper left back tooth about 1 month ago, she pushed the gums around that tooth with her fingernails, and a white pus (not sticky) with blood came out. The swelling and pain disappeared after a few days. The gums around that tooth are not swollen, but are now flabby and have bled every time she brushes her teeth for 1 week. She now worries that it may get worse and

wants appropriate treatment. It does not hurt when she has neither cold water nor hot water. She has not taken any painkillers.

Past dental and medical history

Mrs. Yamamura has not been to a dentist since 2 years ago when she had her cavity treated. She has had pain around her knees when she goes up and down stairs for 2 months. She visited an orthopaedist and was told that the cushions of her knees are worn out and was advised to take a painkiller (Morbic) at one tablet per day. The pain has been alleviated but not completely cured.

Oral health behaviour

She is indifferent to oral care and had not often been brushing her teeth. However, she has frequently brushed her teeth for 1 month because she worries that her tooth condition (periodontitis) may get worse. She thinks that one of the causes may be because she left the periodontal disease untreated. She does not remember what the dentist explained to her about periodontitis 2 years ago. She thought it was good enough to have her cavity treated at that time. She has little knowledge about periodontitis.

She can visit a dentist any time, but she wants the treatment to be easy and to take less time if possible, because she is busy with her children's entrance examinations.

Social history

Mrs. Yamamura is a housewife. She is now busy helping her two children prepare for their entrance examinations for high school and a junior high school. Her husband runs a real estate agency as well as comic book cafes, taking over his father's job. He is really busy with the opening another cafe.

Appendix C
Thirty-seven clinical features in response to 19 key point questions of the case scenario at pre-training test (Appendix A)

(The thirty-seven clinical features are underlined and numbered in parentheses)

Dentist questions	Expected SP responses
1. What can I do for you?	I have been experiencing pain (1) in my lower (2) left (3) back tooth (4).
2. Do you know exactly which tooth it is?	The second tooth from the back (5).
3. Can you tell me when the pain started and how your symptoms have changed?	Since last week (6), I have felt a dull (7) pain (8) when I chew (9). I had spontaneous (10) pain (11) after I took a bath (12) last night (13). I feel no pain right now (14), but I am afraid that I might have the pain again.
4. Is this your first time to feel the pain? Have you had similar symptoms before the pain started?	Only when I was tired (15). I have felt pain when I chew (16) since last year (17). Also, I sometimes felt my tooth becoming loose (18). However, when my health condition improved, the pain automatically disappeared (19).
5. Did you take painkillers when the pain started?	No (20). I had been in pain for about 1 h and then the pain disappeared, so I did not take any painkillers.
6. Is your tooth sensitive to hot or cold?	No, it is not sensitive to either of them (21).
7. Has that tooth been treated before?	Yes, it has been treated and I had a crown (22) about 3 years ago. (either of the two).
8. Do you have any idea why it started to hurt?	I thought my bad health condition (I have been very busy) caused the pain (23).
9. Do you have any trouble with your teeth other than that tooth?	No (24), I don't.
10. Have you ever had any serious illnesses?	No (25), I haven't.
11. Are you being treated for any condition at present?	I am being treated for high blood pressure. I take a medicine (26) to lower my blood pressure.
12. Can you tell me the name of that medicine?	I don't remember the name (27).
13. Please tell me what your blood pressure was before taking the medicine.	It was 160 (28) over 90 (29).
14. Please tell me what your blood pressure was after taking the medicine.	It was 120 (30) over 70 (31).
15. Have you ever had dental anaesthetics?	Yes (32), I have.
16. Have you ever had any problems such as feeling bad when you had dental anaesthetics?	No (33), I haven't.
17. Do you have any allergies?	No (34), I don't.

Dentist questions	Expected SP responses
18. Please tell me if you have anything you want for the treatment?	I can see a dentist any day except Thursdays (35). (Female version). I can only see a dentist first thing in the morning (35). (Male version). Also, I want my treatment performed within 1 month (36).
19. Do you have anything you want to add or forgot to tell?	No (37), I don't.

Appendix D
Thirty-seven clinical features in response to the 19 key point questions of the case scenario at post-training test (Appendix B)

(The thirty-seven clinical features are underlined and numbered in parentheses)

Dentist questions	Expected SP responses
1. What can I do for you?	My gums (1) bleed (2) when I brush my teeth (3).
2. Do you know exactly which tooth it is?	The upper (4) left (5) back (tooth) (6).
3. Can you tell me when the pain started and how your symptoms have changed?	For 1 week (7), my gums have bled whenever I brush my teeth. I have had a dull (8) pain (9) and swelling (10) for 1 month (11). I pushed the gums around that tooth with my fingernails and a white (12) pus (13) (with blood) came out. The swelling and pain disappeared (14) after a few days (15).
4. Is this your first time to feel the pain? Have you had similar symptoms before the pain started?	When I had a treatment for a cavity about 2 years ago (16), I was told that my upper left back tooth had periodontal disease (17) and needed treatment. However, I did not go to a dentist for periodontal treatment because I did not have any pain and the tooth was not swollen. However, for about 1 year (18), I have felt a loosening (19) of the upper left back tooth when I was tired.
5. Are you in pain and is the tooth swollen right now?	I do not have any pain (20), but the gum that was swollen is now flabby (21).
6. Has your tooth ever been sensitive to hot or cold?	No, the tooth has never been sensitive to hot or cold (22).
7. Has that tooth been treated before?	No (23), it hasn't.
8. Do you have any idea why it started to hurt and become swollen?	It is because I left it untreated (24), even though I was told that my tooth had periodontal disease.
9. Do you have any trouble with your teeth other than that tooth?	No (25), I don't.
10. Have you ever had any serious illnesses?	No (26), I haven't.
11. Are you being treated for any condition at present?	I have a prescription medicine (27) from an orthopaedist.
12. Can you tell me what kind of medicine it is?	I think it is a painkiller (28).
13. Can you tell me the name of the medicine?	I think it is Morbic (29).
14. How often and how many tablets are you taking in a day?	One tablet (30) once (31) a day.
15. Have you ever had dental anaesthetics?	Yes (32), I have.
16. Have you ever had any problems such as feeling bad when you had dental anaesthetics?	No (33), I haven't.
17. Do you have any allergies?	No (34), I don't.
18. Please tell me if you have anything you want for the treatment?	I can visit at any time (35), but I want the treatment to be easy (36).
19. Do you have anything you want to add or forgot to tell?	No (37), I don't.