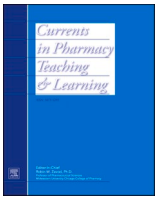
Currents in Pharmacy Teaching and Learning 18 (2026) 102447

Contents lists available at ScienceDirect

Currents in Pharmacy Teaching and Learning

journal homepage: www.sciencedirect.com/journal/currents-in-pharmacy-teaching-and-learning



Research Paper

Pharmacy students' views and experiences regarding an online video-recorded objective structured clinical examination: A mixed-methods survey study

Kieran Dalton *, Kate Scannell, Aisling Kerr

Pharmaceutical Care Research Group, School of Pharmacy, University College Cork, Cork, Ireland

ARTICLE INFO

Keywords:
Education
Objective structured clinical examination
Pharmacy
Technology
Video recording

ABSTRACT

Introduction: Pharmacy students were given the opportunity to participate in an online video-recorded objective structured clinical examination (OSCE) with pharmacist feedback. This study aimed to evaluate their views and experiences regarding this initiative and reviewing the recording.

Methods: Third year undergraduate pharmacy students ($n = 68$) were invited to participate in a formative video-recorded OSCE station online, followed by a one-to-one feedback discussion with a pharmacist facilitator. Participants were sent one questionnaire on the same day after the OSCE and another after receiving the video recording (seven days later). Closed-ended questions were analysed using descriptive statistics and open comments underwent conventional content analysis.

Results: Twenty-three students participated: 20 responded to the first questionnaire and 15 responded to the second. Nearly all students enjoyed the OSCE experience (94 %), and 75 % agreed that knowing they were being recorded had no meaningful impact on their performance. All were satisfied with the feedback quality; 79 % agreed that reviewing the recording had a greater impact on them versus receiving the pharmacist feedback alone. Whilst some were uncomfortable watching the recording, students became more aware of their body language, and 93 % agreed both i) that watching the recording made them more self-aware of what skills required development, and ii) that they would watch the recording to help prepare for future OSCEs.

Conclusion: This study has shown that video-recorded online OSCEs are beneficial and enjoyable for pharmacy students, and has underlined the added value of providing a recording to raise pharmacy students' self-awareness and improve their clinical skills.

Introduction

In many undergraduate pharmacy training programmes worldwide, clinical skills are often assessed using objective structured clinical examinations (OSCEs). These assessments help ensure that students are competent in many clinical skills required for practice, such as decision-making, communication, and performing physical tasks.[1,2] Some of these skills, either individually or combined, cannot be readily assessed with written examinations, and necessitate to be interactive in nature.[1,2] With OSCEs typically taking place in person, the COVID-19 pandemic required minimisation of in-person interactions and thus challenged teaching staff to conduct

* Corresponding author at: School of Pharmacy, University College Cork, College Road, Cork, Ireland.
E-mail address: kieran.dalton@ucc.ie (K. Dalton).

https://doi.org/10.1016/j.cptl.2025.102447

Available online 8 September 2025

OSCEs online to the same high standards.

Telehealth in pharmacy settings has grown substantially in recent years, with evidence to support its increased integration into future pharmacy practice.[3] Additionally, the use of technology in pharmacy programmes has never been more prevalent, in part helped by COVID-19, and research has shown that students would prefer an even greater use of technology.[4,5] As new developments in technology arise, there is increased pressure on higher education institutions to modify the educational methods used.[4,6] Whilst research has shown that students felt that conducting OSCEs online did not significantly impact their performance,[6,7] it is important that students do not feel hindered by such online OSCEs – or possibly that there should be other added values by having these assessments online, such as video recording them. Although the use of video recording in higher education is not a new concept, having been used for many years to assess presentation and self-assessment skills, among other uses.[8] Video-recording as a self-reflective and self-assessment tool has been proven to be beneficial.[8–14] It allows students to identify areas in which they need to improve, as well as enhancing their reflective skills and increasing confidence.[9,12–14] In a world where being online has never been so prevalent, pharmacy education needs to further evolve with this and increasingly incorporate the use of video recording, both online and in person, as a method of self-assessment and self-reflection. The COVID-19 pandemic resulted in an increase in studies investigating the use of online OSCEs.[6,7,15] With these, it is vital to obtain student feedback to ensure further improvements to teaching and assessment. Hytönen and colleagues reported that dental students' feedback proved very useful in modifying their national OSCE during the pandemic,[15] and Savage et al. utilised pharmacy students' feedback to develop strategies to enhance online OSCE implementation.[16] Whilst many studies have investigated online OSCEs and recorded OSCEs separately, potentially with stakeholders' views included,[17–19] it has been more limited with investigating students' views of both aspects concomitantly. When it comes to pharmacy research, a previous study has explored pharmacy students' views of an online recorded OSCE with recordings of simulated patients (i.e. asynchronous).[20] However, there appears to be a paucity of pharmacy education research regarding the use of video-recorded online OSCEs with a synchronous simulated patient interaction and students' views of them. Therefore, the aim of this study was to conduct formative video-recorded OSCEs online with pharmacy students involving synchronous simulated patient interactions, and to evaluate their feedback on this initiative using questionnaires.

Methods

Study context

At the time of this study, undergraduate pharmacy students in University College Cork (UCC) did not undertake OSCEs until the 3rd year of the 5-year integrated Master of Pharmacy (MPharm) degree (formative), with summative OSCEs in 4th and 5th year. Prior to the COVID-19 pandemic, 3rd year students had the opportunity to undertake an in-person OSCE with pharmacist facilitator feedback, which was not recorded, nor were any OSCEs for these pharmacy students. In April 2021, a formative video-recorded online version of this OSCE was used instead for 3rd year students to minimise in-person interactions with COVID-19. This initiative was grounded by constructivism as a pedagogical framework,[21] and particularly guided by experiential theory and reflective theory – ensuring that learners actively build their own knowledge and understanding based on this experience and through reflection, thus enhancing their self-awareness, identifying strengths and weaknesses, and adapting to feedback.[22,23]

Ethics approval and study reporting

Ethics approval was granted by the UCC School of Pharmacy Social Research Ethics Committee (reference: 2021–002). The Standards for QUality Improvement Reporting Excellence in Education (SQUIRE-EDU) checklist guided study reporting.[24]

Study design and OSCE structure

A 45-min information session on the video-recorded online OSCE and points regarding OSCEs in general was provided to students three weeks prior to the OSCE via Canvas®, UCC's virtual learning platform. Once ethics committee approval was attained, the information sheet and a link to the consent form were provided to students via Canvas® two days prior to the OSCE. Students were instructed to read the information sheet and then in the consent form to either:

- click 'Yes' if they wanted to participate in an online video-recorded OSCE,
- click 'No' if they wanted to participate in an online non-recorded OSCE, or
- click 'No' and email the principal investigator (KD) to confirm that they did not wish to participate in any OSCE.

Students who chose not to undertake this OSCE did not have to undertake an alternate assessment. All students who wished to participate in an online OSCE were invited via email to a 15-min videoconference meeting on Microsoft® Teams with a UCC-affiliated pharmacist facilitator. Five pharmacists (with an average of 5 years' post-registration experience) were recruited to facilitate the

OSCEs and provide individualised feedback after the interactive OSCE component. All facilitators received standardised instructions on how to coordinate the OSCEs and provided their written informed consent to participate in the study. All participants were made aware that recordings could be reviewed by staff to enhance future teaching and assessment.

In the assigned 15-min slot, each student was provided six minutes for the OSCE station (one minute of reading time and five minutes for interaction). The OSCE station involved a patient request for something to treat constipation in a community pharmacy setting, whereby the patient was taking an iron supplement and unaware that this may be a contributory factor.

Once the station was complete, facilitators informally asked students how they felt they performed and received individualised feedback from their facilitator. Both the OSCE station and the feedback discussion were recorded using Panopto® software; the rationale for this was to not have the distraction of an obvious on-screen recording indicator, whilst allowing the recording to be shared via Panopto® afterwards.

Distribution of feedback questionnaires and video recording

To attain student feedback on this initiative, participants were sent two questionnaires – one on the day of the OSCE and the other after receiving the video recording. Each questionnaire was preceded by an information sheet reflective of the details in the main information sheet.

On the day of the OSCE (after its completion), participants were sent two emails:

- one containing a link to the first questionnaire (Appendix A) from the principal investigator, and
- one containing a unique code to pseudonymously link student responses between the study's two surveys, which was provided by a staff member not involved in data analysis.

The first questionnaire was closed to responses after seven days. Thereafter, on the same day, the principal investigator emailed all participants a link to their individual video recording and a link to the second questionnaire (Appendix B). The OSCE station assessment checklist was also provided so that students could self-assess their performance.

Questionnaire design

Two questionnaires were utilised to ensure students initially provided their views on the OSCE without being influenced by reviewing the recording and thereafter to attain their opinions having viewed the recording. The questionnaires were designed by the research team, fostered by a review of existing literature.[25–32] The first questionnaire (Appendix A) was divided into four sections:

i) demographics: gender, self-rated skills, work experience, and preferred future workplace.
ii) views on the OSCE as an assessment method.
iii) views on the feedback received from the pharmacist facilitator, and
iv) views on the online and recorded nature of the OSCE.

The second questionnaire (Appendix B) was divided into two sections, evaluating:

i) how students felt after reviewing their video recording, and
ii) how students would feel about their video performances being used in the future by themselves and/or others.

Both questionnaires were delivered via Microsoft® Forms and employed various question types, such as i) multiple-choice questions and Likert-scale ratings to collect quantitative data and ii) questions with free text boxes to capture qualitative data.

Data analysis

The quantitative data acquired were mainly in text form; extensive data remediation was conducted to give a numerical set, which was then added into IBM® SPSS and analysed using descriptive statistics. The percentage response rate for each questionnaire was calculated by dividing the number of responses received by the number of students who were emailed the questionnaire, and then multiplying by 100. A frequency analysis of each question was done, with the denominator as the total number of students who responded to each question.

All open comments from students were entered into NVivo® 12, and underwent conventional content analysis.[33] Each response was open coded and categorised by KS and KD, with themes inductively generated through discussion (all authors), iteratively refined,

and then named before finalising the write-up. The themes were generated from analysing the responses to each question separately, and quotations selected as evidence were those which best represented the themes.

Reflexivity

Reflexivity was considered throughout the study to minimise researcher bias in influencing the study findings. At the time of the study, KD (male) and AK (female) were working as lecturers in clinical pharmacy practice in UCC, and were the creators of this OSCE and the associated surveys. KD and AK had 4.5 and 4 years' experience of teaching undergraduate pharmacy students (including both full-time and part-time teaching), and both were pharmacist facilitators for this study's video-recorded online OSCE. KD and AK had 6.5 and 4.5 years' post-registration experience as a pharmacist respectively, which included working as a community pharmacist (relevant given the focus of this study's OSCE station).

KS (female) was a 5th year pharmacy student of a 5-year undergraduate pharmacy programme in UCC. As part of the 4th year of the programme, KS had undertaken a literature review on video recording of pharmacy students in teaching and assessment. All authors had experience of undertaking OSCEs and all had watched video recordings of themselves as part of an undergraduate pharmacy programme. None of the authors had ever been a student participant in a video-recorded online OSCE.

The authors considered how their views and experiences before and during the study may influence the research. Whilst the authors embraced this experience as a positive in informing design and analysis of the surveys, the authors acknowledged their biases and ensured that the interpretations were grounded in the data as best as possible.

Results

Of the 68 students undertaking the 3rd year module that included the online OSCE, 24 undertook this OSCE (35.3 %). Twenty-three students consented to be video recorded (95.8 % of OSCE participants; 33.8 % of the module's students).

Results of first survey after the OSCE

Respondent demographics

Twenty students responded to the first survey (86.9 %). Twelve self-identified as female (60 %), four as male (20 %), and four provided no response (20 %).

Regarding self-rated clinical knowledge, 15 % selected 'Excellent', 60 % 'Good', and 25 % 'Average'. Regarding self-rated communication skills, 10 % selected 'Excellent', 55 % 'Good', and 35 % 'Average'.

Regarding their preferred workplace after graduation: 55 % selected '*community pharmacy*', 35 % selected '*hospital*', and 5 % each selected '*pharmaceutical industry*' and '*academia*' respectively.

Eleven students (55 %) indicated that they worked in a community pharmacy at the time of the study: 81.8 % part time during term, 72.7 % full time outside of term, and 9.1 % part time outside of term. Three students (15 %) had previously worked in a community pharmacy but not at the time of the study (two as part time outside of term, and one as full time outside of term). Six students had not worked in a community pharmacy (30 %).

OSCE as an assessment method

Students' views about OSCE as an assessment and their performance are shown in Table 1.

Table 1
Views on OSCE as an assessment and student performance.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
OSCE as an assessment and student performance					
The instructions at the OSCE station were clear and unambiguous. ($n = 20$).	70 %	25 %	–	5 %	–
The time at the OSCE station was adequate. ($n = 20$)	45 %	40 %	5 %	10 %	–
Having seen an OSCE station and the marking scheme, I think that an OSCE is a fair method in the assessment of clinical competence. ($n = 20$)	45 %	55 %	–	–	–
The OSCE reinforced what was learned in the other components of the module. ($n = 19$)	47.4 %	42.1 %	5.3 %	5.3 %	–
Excluding placements, I believe that working in a community pharmacy setting increases one's ability to perform better in OSCEs. ($n = 20$)	70 %	30 %	–	–	–
The OSCE highlighted the areas of weaknesses in my skills and knowledge. ($n = 20$)	60 %	35 %	5 %	–	–
I feel more motivated to increase my level of clinical competency after the OSCE. ($n = 20$)	60 %	35 %	5 %	–	–
I enjoyed this OSCE experience overall. ($n = 17$)	52.9 %	41.2 %	5.9 %	–	–

When asked to rate their degree of nervousness for this OSCE:

- 10 % were not nervous at all.
- 45 % were slightly nervous.
- 25 % were moderately nervous.
- 20 % were extremely nervous.

When asked to rate the OSCE's degree of difficulty:

- 5 % found it very easy.
- 10 % found it easy.
- 85 % found it of average difficulty.
- No students rated it difficult/very difficult.

When asked to rate OSCE difficulty and stress in comparison to other examination types:

- Regarding difficulty:
  - ➢ 45 % rated OSCEs as less difficult/significantly less difficult.
  - ➢ 25 % rated OSCEs as about the same level of difficulty.
  - ➢ 30 % rated OSCEs as more difficult.
- Regarding stress:
  - ➢ 50 % rated OSCEs as less stressful/significantly less stressful.
  - ➢ 10 % rated OSCEs as about the same level of stress.
  - ➢ 40 % rated OSCEs as more stressful/significantly more stressful.

Students were provided with open comment boxes to state what they found i) most difficult and ii) most beneficial about the OSCE, with Table 2 displaying the points and supporting quotations.

Table 2
What students found i) most difficult and ii) most beneficial about the OSCE.

i) What students found most difficult	
Decision-making	
Students found they were unsure what to say and found making a decision in a short space of time difficult. They found '*thinking on the spot*' challenging, aiming to resolve the patient's issues based on the attained information.	"*Thinking on the spot*" **[Student 5]** "*Thinking and responding to a question on the spot*" **[Student 14]** *"…trying to think on the spot of what else I needed to find out from the patient and what treatments were and were not suitable"* **[Student 19]** "*Having to think on your feet and come to a diagnosis and resolution on the spot*" **[Student 17]**
Knowledge and knowing what to say	
Lack of knowledge about specific information (e.g. specific medications or dosing) was one difficulty, whilst others found it difficult to recall their knowledge and apply it in an OSCE setting. Some were concerned about not knowing what to say or not being able to say anything.	*"I didn't know the specifics about the product I was giving"* **[Student 12]** "*I was unsure of doses to advise the patient"* **[Student 3]** *"Applying clinical knowledge quickly and accurately"* **[Student 13]** "*To recall the information instinctively, which requires a lot of practice to make it ingrained to your mind*" **[Student 10]** *"I was worried that I would go blank or say something that was incorrect*" **[Student 1]** "*Thinking of questions to ask to find out more information about the patient*" **[Student 8]**
Exam preparation and format	
Difficulties were identified with exam conditions, content, and being unfamiliar with OSCE formats – which made it harder to prepare. Students also compared the format to other examinations, citing less time to reflect during the OSCE.	*"Preparing for the OSCE. It is hard to know where to start and what exactly you need to know"* **[Student 7]** *"I was unsure about the type of questions that would be asked"* **[Student 1]** "*I think not knowing really what it would be like was the most scary part but once it was started it really did fly*" **[Student 11]** "*When compared to other exams you cannot feel as prepared which is of benefit as in practice this will also apply*" **[Student 9]** "*…written exams you have time to think of many different options and once answered you can review and reflect and add in other bits you think of"* **[Student 5]**
Managing time and nerves	
Some students felt they ran out of time and/or did not get to cover everything they would have liked. Not rushing and taking their time was also flagged as important. The nerves in being assessed was a hindrance to OSCE performance. These	"*Personally, I ran out of time in today's session. Going forward I will keep better track of my time in order to avoid this happening again*" **[Student 2]** *"Time management. Saying everything in the short time"* **[Student 4]** "*Most challenging thing for me was to stay calm and to take my time doing the OSCE"* **[Student 6]**

(*continued on next page*)

Table 2 (*continued*)

nerves may have eased as time passed during the exam when further information was revealed.	"*I found the beginning of the OSCE to be the most challenging…However, as the OSCE progressed and we gained more informanntion about the case, I began to relax*" **[Student 9]** "*I think relaying the knowledge I knew, I think nerves probably stopped me from asking the questions I knew I should have asked"* **[Student 15]** "*I found my nerves prior to the OSCE the most difficult. Working in community pharmacy I can speak to patients without any nerves but when being assessed I can get very nervous which can cause me to lose my train of thought or find it difficult to focus*" **[Student 16]**
ii) What students found most beneficial	
Opportunity to practice patient interaction	
Students had a chance to practice and improve their patient interaction skills in a "*realistic*" clinical scenario, which helped students' confidence and gave them an insight into what would be expected of them in their future practice as a pharmacist.	"*…testing communication skills*" **[Student 13]** *"It gave me experience of a possible encounter in a community pharmacy and showed how much I need to think about during consultations with patients"* **[Student 19]** *"Being able to practice what a scenario would be like in the clinical setting."* **[Student 8]** "*Good practice for coming years*" **[Student 1]** "*OSCEs when compared to other forms of examination are extremely effective at reflecting what it will be like to practice as a pharmacist in the future"* **[Student 9]** "*Helped give a realistic situation, and provide an understanding of what actions to take in future situations in the pharmacy*" **[Student 14]** "*The real-life nature of an OSCE has much more relevance to the work we will be doing rather than a written exam*" **[Student 4]**
The facilitator feedback	
Students found the feedback from their pharmacist facilitator very beneficial in identifying how to improve and different approaches that could be taken. Students appreciated receiving the one-to-one feedback and perceived that it built their confidence and would help better prepare them for future patient interactions.	*"The feedback was very beneficial, knowing the areas I need to improve"* **[Student 6]** *"The feedback provided at the end was also a great addition"* **[Student 2]** *"The feedback bit afterward I found it really useful to talk about ways I could have gone about having an interaction with a patient*" **[Student 15]** *"I liked receiving feedback from the pharmacist as it will provide me with the tools to put in place for future OSCEs and practice as a pharmacist*" **[Student 20]** "*The feedback from the lecturer was very helpful. They gave advice on how to improve my approach to the OSCE and how to improve my interaction with the patient*" **[Student 18]** *"The feedback was also useful as I can use it to increase my competence and confidence"* **[Student 3]** *"I also find by having opportunities like these to work one on one with the lecturers you learn a lot and it has helps build confidence…the feedback is specific and constructive*" **[Student 7]**
Exam format familiarisation and future preparation	
Familiarising themselves with the OSCE format may help ease students' nerves and aid exam preparation in future.	"*What I found most beneficial was simply gaining the experience of how an OSCE works. Giving I was nervous for this OSCE which was unmarked, I can imagine I would be even more nervous for a graded OSCE. Knowing what to expect now in OSCEs in the coming years will make them less daunting*" **[Student 16]** *"The preparation aspect for next year. I know I will be more calm once I know what it will entail"* **[Student 11]** "*…it was our first OSCE and hopefully it will stand to us in future years!*" **[Student 2]**
The formative nature of the assessment	
Given its formative nature, this reduced the pressure and facilitated students enjoying the OSCE experience more.	"*Due to the fact there was no marks going for this OSCE, it significantly reduced the stress associated with the task*" **[Student 2]** "*I really enjoyed just doing the OSCE worth no marks…and a lot can be learned from the process of preparation and the OSCE itself*" **[Student 7]**

Feedback

When asked to what extent the self-assessment of their performance aligned with the facilitator feedback, 60 % believed their estimation was about the same as the facilitator, 25 % stated they somewhat underestimated their ability, and 15 % stated they somewhat overestimated their ability. No students believed they greatly overestimated or underestimated their ability.

All students agreed they were satisfied with the quality of the facilitator feedback (80 % strongly agreed/20 % agreed), and that the feedback helped them understand areas in which they needed to improve (90 % strongly agreed/10 % agreed).

The majority (65 %) agreed there was no meaningful difference in this virtual evaluation with pharmacist feedback compared to

Table 3
Views on the online and video-recorded nature of the OSCE.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
The fact that it was video-recorded made me spend more time in preparing for this OSCE. ($n = 20$)	10 %	20 %	25 %	35 %	10 %
Knowing that I was being recorded had no significant impact on my performance during the OSCE. ($n = 20$)	30 %	45 %	5 %	15 %	5 %
I think I will learn more from reviewing the video recording of the OSCE than doing the OSCE alone. ($n = 20$)	35 %	45 %	15 %	5 %	–
Conducting the OSCE virtually (rather than in person) had no significant impact on my performance. ($n = 20$)	20 %	30 %	5 %	40 %	5 %
I found it difficult to get a personal connection with the simulated patient in the virtual environment. ($n = 20$)	15 %	10 %	25 %	50 %	–
This virtual OSCE has prepared me for the possibility of telepharmacy in future ($n = 20$)	35 %	45 %	15 %	5 %	–

Table 4
Feelings about being video-recorded and thoughts on watching the video recording of the performance before seeing it.

Feelings about being video-recorded	
Did not mind or notice	
Students overall did not mind being video-recorded, and some forgot about it as they were focused on the task at hand, especially when there were no on-screen indicators to distract them.	"*I didn't mind*" **[Student 1]** "*Personally, I did not mind being recorded in the slightest*" **[Student 2]** "*I didn't mind at all*" **[Student 5]** "*I had no problems with being video-recorded*" **[Student 8]** "*Honestly, I didn't feel any bit different from how I would feel if it wasn't recorded*" **[Student 15]** "*Initially I was a bit nervous about the prospect of being video recorded. However, upon additional reflection, the thought of being video recorded didn't bother me as much and by the time the OSCE commenced I was so focused on the case details I had completely forgotten about the fact the OSCE was being recorded!*" **[Student 9]** "*I did not think too much about the video being recorded. Leading up to the OSCE my main focus was on reviewing my lecture notes and ensuring I could do well in the assessment. During the OSCE itself I forgot about the recording and focused on the task*" **[Student 16]** *"…it didn't really bother me. I forgot that it was being recorded while I was consulting with the patient*" **[Student 19]** "*It did not affect my performance. There was no indication on the screen saying that the call was being recorded so I was not distracted during the OSCE*" **[Student 18]**
Apprehension and conscious of staff viewing	
Knowing some staff may view their video recording added pressure, so students were more nervous about this and subsequently wanted to do well and appear as competent.	"*Slightly more nervous*" **[Student 17]** "*Nervous*" **[Student 11]** *"At first, I felt quite apprehensive about being recorded. However, I recognised the benefits that this OSCE recording could provide me with."* **[Student 20]** "*The video recording was of course optional, and in a way it did bring an extra added bit of pressure cause lecturers etc can review this material in time*" **[Student 2]** "*I was conscious of the fact that the video would be assessed by multiple people in the future and I wanted to come across competent for this reason*" **[Student 16]**
Beneficial to students	
Taking part in this study was beneficial for: i) themselves, as it allowed them to review and reflect prior to future assessment. One student noted that this would be useful due to internet issues during the OSCE. ii) future students, as it was recognised that this research could improve the course.	*"It may be beneficial for the future upon reviewing"* **[Student 13]** "*I know it will benefit me for next year that I can look back at this recording*" **[Student 6]** "*I think it will be helpful as the internet connection was very poor so I'm hoping watching it back I will be able to hear what I missed*" **[Student 4]** "*It's nice to be able to contribute to research while also directly benefiting from the experience by getting practice in for future OSCEs*" **[Student 15]** "*I was quite nervous about it being video recorded but I can understand the overall benefit of the process"* **[Student 7]** "*I was conscious being recorded but I know it will benefit me for next year that I can look back at this recording*" **[Student 6]** "*I felt a bit apprehensive at the beginning but as it will be used to improve the course and help future students the good aspects outweighed the negative"* **[Student 3]**
Thoughts on watching the video recording of your performance before seeing it	
Reviewing from a new perspective	
Respondents felt it was an opportunity to review their communication skills from a fresh perspective. Students were particularly interested in how they came across to a patient.	*"It will be useful to see how I come across to other people and to view myself in the third person and see if I seem friendly and welcoming as a pharmacist*" **[Student 19]** *"It will allow me to see both my verbal and non-verbal skills*" **[Student 9]** *"I am quite nervous. I have never watched myself back on a consultation before. I am looking forward in a way to seeing my non-verbal communication, for instance hand gestures, eye contact etc"* **[Student 7]**

(*continued on next page*)

Table 4 (*continued*)

Benefits will outweigh any awkwardness Some students did note that it may be difficult or embarrassing to view their own performance, but identified it to likely be of benefit overall.	*"I feel a bit embarrassed but overall it will be beneficial"* **[Student 12]** *"I'm looking forward to watching the video recording although I'm sure it will be awkward when watching it at the time I'm sure it will be of great benefit"* **[Student 9]**
Identifying areas where they performed well or not As well as being able to identify areas to improve, students also thought it would enable them to identify areas that they performed well.	"*I am excited to have the video so I can review it before future OSCEs so I can analyse my performance and see what I should or should not do again, self-reflection is always important*" **[Student 15]** *"It could be beneficial to be able to see where I need to improve for future OSCEs"* **[Student 8]** "*Obviously, we are going to pick on the aspects we would like to improve on and maybe even laugh at how foolish some aspects of our OSCE were, but this is only all natural"* **[Student 2]** *"Hopefully it won't be too embarrassing, but I do think it will allow me to pinpoint places in the conversation where I could have asked/advised more"* **[Student 3]** "*…see areas where I can improve on but as well as that I feel it will help us as students identify areas where we did well. Often when doing these sorts of examinations, we are quick to doubt ourselves and I feel that watching these videos back might show us areas where we are doing well and hopefully build our confidence as well as areas we can improve!*" **[Student 9]**
Having a record of the performance Students noted that they may forget how they performed, and that it should be beneficial to have a record of their performance to aid future ways to improve. Students compared the OSCE to previous sessions where they had to counsel patients, where they previously may have been left wondering how they got on.	*"I think it will be beneficial as I tend to forget what I have said in an OSCE or dispensing lab after I have done it… Having a video recording will also allow me to assess my body language and how I present myself to a patient which is not an opportunity we have had previously"* **[Student 16]** *"When doing an OSCE, you tend to get lost in the moment and by the time you are finished you forget half of the things you just said (whether good or bad). The video recording will allow us to reflect on this quickly and easily".* **[Student 2]** *"In previous…consultations….many of us always seem to wonder 'what did I say there in that situation' or 'how did I approach that counselling'. We may forget certain aspects of our counselling sessions that when revising for future OSCEs, may be beneficial to have a documented and video resource to look back on"* **[Student 20]**

similar in-person evaluations with pharmacist feedback (20 % strongly agreed/45 % agreed); 10 % neither agreed nor disagreed, 20 % disagreed, and 5 % strongly disagreed.

Virtual and recorded nature of the OSCE

Regarding any potential technical issues during the OSCE (e.g. video lagging, low-quality audio), 70 % experienced no issues, 25 % had minor issues that did not affect their performance, and 5 % ($n = 1$) experienced minor issues that affected their performance. Table 3 displays students' views on closed-ended statements regarding the OSCE's online and video-recorded nature, whilst Table 4 provides students' feelings about being video-recorded and thoughts on watching the recorded performance before seeing it.

Results of second survey after receiving video recording

Fifteen students responded to the second survey (65.2 %). Fourteen students responded to both surveys (60.9 %).

Reviewing performance on video

When students were asked how easy or difficult they found it to use the checklist to review their performance on video, 73.3 % said very easy, 20 % said somewhat easy, and 6.7 % said they were undecided. No student found it difficult.

When asked if they would think that a pharmacist assessor observing and rating their performance in person would not be different from a pharmacist assessor observing and rating their performance retrospectively on a video recording, 26.7 % strongly agreed, 60 % agreed, 6.7 % disagreed, and 6.7 % strongly disagreed.

Table 5 shows students' views after watching the video recording i) responding to fixed statements, ii) how they felt after watching themselves, and iii) what they learned about themselves after reviewing their performance.

Hypothetical peer review of recording

When students were asked if they would they like to see a video recording of at least one of their peers undertaking an OSCE station if the peer could also see theirs, 46.7 % answered yes, 40 % answered no, and 13.3 % were undecided. Students were then asked to explain why they would or would not like to have a recording of at least one of their peers and/or for their peers to have a recording of them, with the reasons displayed in Table 6.

Table 5
Views after watching the video recording and what they learned about themselves.

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree
Reviewing my performance on video has made me more self-aware of what clinical skills I need to develop ($n = 15$)	53.3 %	40 %	6.7 %	–	–
Reviewing my performance on video has made me more self-aware of what communication skills I need to develop. ($n = 14$)	71.4 %	14.3 %	14.3 %	–	–
Reviewing the video recording had a significantly greater impact on me in comparison to receiving the feedback immediately after the OSCE alone. ($n = 14$)	50 %	28.6 %	21.4 %	–	–
I would review this video in future to help prepare for OSCEs in future. ($n = 15$)	60 %	33.3 %	6.7 %	–	–
I would like for my OSCE stations to be recorded if possible for future summative assessments (e.g. continuous assessment or end-of-year examinations). ($n = 13$)	69.2 %	7.7 %	15.4 %	7.7 %	–

How students felt after watching themselves on video and what they learned about themselves after reviewing their performance

A bit strange to watch oneself, but beneficial Students found it strange or uncomfortable to watch at times, notably when they became flustered, but appreciated the benefit in watching themselves and the ability to analyse oneself. There was also a preconception that it would induce embarrassment.	"*A bit weird watching yourself back*" **[Student 11]** "*I didn't particularly enjoy watching back over the video*" **[Student 18]** "*I also became flustered during the OSCE and this was difficult to review*" **[Student 21]** "*I did not like watching myself on video but it allowed me to identify areas I need to improve upon*" **[Student 8]** "*It was a bit awkward watching myself but I feel it was of great benefit*" **[Student 9]** "*I found it a bit strange but I think it has benefited me*" **[Student 6]** "*I thought I would have felt embarrassed watching myself back but I actually enjoyed analysing my performance*" **[Student 15]**
Heightened awareness of non-verbal communication Students acknowledged that it was the first opportunity they had to properly review their non-verbal communication, which was better than receiving feedback on this from their pharmacist facilitator alone. Reviewing the recording allowed students to better empathise with the patient experience; it made them more aware of their body language and how they appeared when counselling a patient. It was also noted that students wanted to appear more confident in future through modifying their non-verbal communication.	*"I feel one great benefit from this form of review is that I saw what my non-verbal skills were like. In the initial feedback there is a focus on the content and verbal skills but I feel seeing myself on video I was able to for the first time critically review my non-verbal skills which is of utmost importance and has been of great benefit to me"* **[Student 9]** "*I found watching myself on video helpful. I remembered the conversation but was completely unaware of my body language which I think I need to work on after seeing the video*" **[Student 16]** *"I learned that I tend to talk with my hands more than I had realised"* **[Student 2]** "*I noticed how nervous I was during the OSCE*" **[Student 18]** "*I've learned how I look while counselling a patient, such as the facial expressions I make, I believe I could appear more confident which would help*" **[Student 15]** *"That I should be more clear and confident discussing case with the patient"* **[Student 14]** "*I noticed my face looked concerned. I should have nodded to indicate to the patient that I was listening. I should have concentrated on the patient rather than looking around me… I found it beneficial as I understood how a patient would feel as I was speaking to them and I should be more aware of my facial expressions"* **[Student 1]**
Maintaining structure and calm nature Students noted how they might optimise the conversation structure to ensure that sufficient questions had been asked and aid information gathering. Students also highlighted the need to be more calm or relaxed in future with such interactions.	*"I was quite aware of the way I was speaking and the cohesiveness of the conversation…I should have asked more questions and not jumped to conclusions"* **[Student 1]** *"I learned that I covered WWHAM* but I made sure to cover all parts of it, which is good, but it did interrupt the flow of the consultation"* **[Student 3]** *"I need to stay more calm and get a better structure to my consultation skills"* **[Student 21]** *"That I need to relax, take my time and listen fully to what the patient is saying. Not to jump straight into each question"* **[Student 6]**
Need to focus on areas for improvement Students felt it focused them on skills deficiencies, and primarily pointed out areas for improvement, rather than areas where they might have done well.	*"Made me more aware of skills and where I was lacking in some. Communication skills were made clear especially"* **[Student 17]** *"Reviewing my performance has highlighted areas that I need to work on. I felt motivated as having the video will give me tools to work on my counselling skills"* **[Student 20]** *"It allowed me to reflect on my performance and what communication skills I need to improve"* **[Student 8]** *"I used 'em' too much where it was not necessary"* **[Student 1]** *"Although we are always going to pick on the bits where we would like to have done better, overall it was a good opportunity to reflect on how the OSCE itself went"* **[Student 2]**
Realising errors or what was missed Students realised mistakes that were made and what was missed, with some associated disappointment.	"*I wasn't happy with how I performed in the OSCE failing to realise the Galfer* [ferrous fumarate capsules] *was causing the constipation so watching the video was difficult.*" **[Student 21]** "*Easy to see mistakes made*" **[Student 14]**

* A questioning acronym used to aid the gathering of information: Who is the patient? What are the symptoms? How long have the symptoms been present? Action taken to date? Medication being taken?

Table 6
Students' reasons for and against peer review of recordings.

Learning from peer comparison	
Overall, students thought that peer review of recordings would benefit them. They would enjoy viewing their peers' videos to learn from their peers' performance – particularly areas in which their peers did well and to observe how their peers approach scenarios differently.	"*It would be nice to compare and contrast against another student, it is always nice to learn from peers, for example they might go about counselling a patient in a different way to me so I feel I could benefit from learning how they do it and* vice versa." **[Student 15]**
Students noted that it would be useful to compare oneself relative to their peers and would allow them "*to see what standard is like*" **[Student 5]**	"*It would be interesting to see how they present themselves and how they gather information from patients. It may help me develop a better system in which I could follow for future OSCEs*" **[Student 18]**
	"*It can be good to see the ways other approach situations such as OSCEs. It could be interesting to see what questions they asked compared to the question I asked and the outcomes they decided on*" **[Student 1]**
	"*You could get an idea of where you could improve for future OSCEs*" **[Student 14]**
	"*Not only is it good to get an idea of where you are located in relation to other classmates, it is also important to learn from what others do. This could include their mistakes or things which they do that I'd like to incorporate into my consultations*" **[Student 2]**
Opportunity for peer feedback	
Some students welcomed receiving peer feedback from such recordings, with it suggested that this could be short-term access.	"*I wouldn't mind people seeing my video recording provided they would only have access to it for a short duration of time. I could see great benefit coming from it if they were asked to fill out a form identifying areas in the OSCE which could be improved as well as which areas went well as this individual would provide a fresh pair of eyes and further insight into our performance*" **[Student 9]**
One student did not think that they should critique others without first improving their own performance.	"*I think the only performance which is valuable for me to review is my own. I need to improve on my own skills and develop my own strategies to perform better before critiquing others and improving myself from watching the way others would do a mock consultation*" **[Student 21]**
Fear of judgement and inappropriate sharing	
Some feared being judged or being mocked by others, whilst noting that security of the recording was also a concern, with the possibility of peers sharing their video.	"*If people made fun of me or if videos were sent around*" **[Student 11]**
	"*If my OSCE had received bad feedback I would not want my peers to see it as I would feel embarrassed*" **[Student 16]**
A suggestion that was made to overcome the hesitancy of peer review was that this concern may be lessened if they reviewed a different year group's recordings.	"*I would not like for my peers to have a recording of me as I would not feel comfortable with them watching*" **[Student 17]**
	"*I don't know, I just would not like someone who isn't an examiner looking at my recording. In case they were judging my OSCE*" **[Student 6]**
	"*I would be a bit embarrassed if it was someone in my year. If I could watch an older year's OSCE, I think that would be helpful. I'd have no problem letting my OSCE be viewed by younger years*." **[Student 3]**

Findings from final open comments sections

At the end of both questionnaires, students were provided with an open text box to share any final comments. Nuanced comments that have not been addressed previously include:

- The initiative "*was a great idea*" **[Student 11]**, and there was surprise at how much benefit would be gained: "*I found it to be more useful than I thought it would*" **[Student 1]**.
- There was satisfaction in contributing to research: "*More than happy to help in this project*" **[Student 2]**.
- As it was near exam time: "*The OSCE was held around exam season and gave me motivation to study for exams*" **[Student 18]**.
- Students were grateful to participate and hope it will reduce future exam-related anxiety: "*Thank you for the opportunity to take part in an unmarked OSCE. Hopefully, this will reduce stress for the marked one next year*" **[Student 3]**.
- It was difficult to establish eye contact and in evaluating and communication body language: "*It's so hard to do 'eye contact' with the virtual set up because you're looking at the screen and not the webcam. I was aware of this so tried to look in the webcam when I thought of it but found myself looking more at the patient on the screen's eyes. Lack of body language communication is hard too*" **[Student 5]**.
- Students really appreciated the recorded aspect of this initiative: "*Thoroughly enjoyed this experience and would love to see more recorded OSCEs going forward*" **[Student 2]** and "*I definitely found this video recording to be beneficial as I was able to identify areas I could improve on that I didn't realise from the feedback after the OSCE alone. I would therefore like to see this type of OSCE implemented in future*" **[Student 9]**.

Discussion

This is the first study to the authors' knowledge that has explored the views of undergraduate pharmacy students undertaking a formative video-recorded OSCE online involving a synchronous simulated patient interaction. Students enjoyed this OSCE experience overall, and perceived this had important benefits to them – making them more self-aware of what skills needed development and that they would review the video to help prepare for future OSCEs.

Successful patient interactions in practice may require significant time input from pharmacists, especially using teach-back

methods.[34] Kerr and colleagues' realist synthesis noted that time-limited interactions for video recordings, such as that used in this study, *may* not achieve positive outcomes in developing pharmacists' communication skills with patients (e.g. due to student stress or reduced authenticity).[35] Even though some students were caught for time in this OSCE, they were very positive about this opportunity's ability to aid their communication skills development. Furthermore, students were satisfied with and benefited from the individualised feedback, which has been shown previously,[14,36] and it helped them identify areas of improvement. Whilst we know that students often overestimate their ability when compared to pharmacist facilitator scores,[8,13] this study found that only 15 % believed they overestimated their ability. However, the pharmacist facilitator feedback may have influenced this difference prior to completing the questionnaire. Although some participants in this study were nervous about being video recorded,[12] the majority recognised its benefit and overall were unaffected by its use. Participants also attested that the video recording enabled them to review their performance in a way they had not done before. Even with the positivity towards the quality of the facilitator feedback, 78.6 % of students agreed that reviewing the recording had a greater impact on them compared to receiving this feedback alone. Therefore, video recording appears to be a highly valuable element to this initiative, and several studies have shown that video-recorded feedback can be superior to other forms of feedback,[37,38] because it offers a way to promote self-awareness and self-evaluation of both positive and negative behaviours, as well as motivate self-improvement[11–13,36] – all of which were clearly demonstrated in this study. In contrast to the 'recorded' element, the 'online' format was not viewed as positively, whereby 45 % of students disagreed or strongly disagreed that conducting the OSCE online (rather than in person) had no meaningful impact on their performance. Therefore, the online element should perhaps be reserved where needed (e.g. if social distancing is required or as part of distance-learning programmes), so the main benefit for educators to consider is with incorporating recorded elements like this to enhance student learning.

Given that the majority of pharmacy students from this university typically have their primary workplace as a patient-facing setting after graduation,[39] it would appear useful for them to be able to self-evaluate their clinical communication skills. Students distinctly emphasised that the video recording in this initiative allowed them to review their non-verbal communication skills and to evaluate how they would come across to patients in real-life practice, which prior research has indicated that this will help them improve these skills going forward.[12,13] Furthermore, students also noted their lack of confidence in their communication; this is important as confidence and assertiveness have been identified as key facilitators in pharmacists' recommendations being implemented by their doctor colleagues.[40] With constructivism as a pedagogical framework and both experiential theory and reflective theory guiding this initiative,[21–23] our findings showed that the recordings particularly helped students self-identify errors, omissions, and areas for future improvement – emphasising the power of reflection and its importance in pharmacy education.

One quarter of this study's participants found it difficult to get a personal connection with the simulated patient online. Previous research has found that students and examiners find that non-verbal communication (notably eye contact), empathy expression, and rapport-building can be hindered in an online environment,[7,41] making the assessment of non-verbal communication skills challenging online.[16] Therefore, this has salient implications in choosing the types of OSCE stations to be run online and in making both students and examiners aware of such issues. Furthermore, with the growing use of online-mediated communication, this emphasises the increased importance of teaching 'digital empathy' and 'e-professionalism' to students of healthcare professions.[42]

Participants in this study acknowledged the benefit of having the recording to see how they would come across to a patient, whilst also seeing the simulated patient's face – both with front-facing views. If the study were conducted in person, this would likely require the use of two standard cameras (one each to capture front-facing views of both the student and the simulated patient) or a specialised camera to capture both sides synchronously – which would be both an at additional cost and/or could impact student performance. In this study, Panopto® was used to record rather than the Microsoft® Teams videoconferencing platform; this meant that there was no on-screen indicator that a recording was taking place, and students reported that they did not notice they were being recorded, further supported by the subtlety of the camera. This should be considered for future online recorded OSCEs to minimise distraction.

Given these positive views on recording, over three-quarters of this study's respondents (76.9 %) also agreed that they would like OSCE stations to be recorded for their future summative assessments if possible. Whilst it may be useful for students and academic staff to review such recordings, it may generate issues with examination appeals. Even though 86.7 % of this study's participants agreed that assessors' in-person ratings would not be different from retrospectively rating a video recording, previous research has described challenges with reviewing OSCE recordings and mixed results with inter-assessor reliability.[18,19,43]

This study has corroborated findings from Kakadia et al. that students are receptive to online OSCEs and welcome future opportunities like this.[6] A benefit of conducting OSCEs online is that they require less resources (e.g. room bookings or additional staff to ensure cameras are operating correctly). This perhaps re-affirms that such online OSCEs are not just something confined to pandemic times, but may continue to be useful in the assessment of students from a remote location, including international students.[6,7] However, conducting OSCEs online can bring about other challenges. Firstly, each student needs a device to partake in an online OSCE. Baticulon et al. found in their study from the Philippines that not all medical students had access to a device or internet, which acted as a barrier to learning.[44] Furthermore, one participant in this study experienced technical difficulties that reportedly impacted their performance, which has been an issue in other similar studies.[6,7,16] Academic integrity is also a drawback of an online OSCE for marked or summative assessments. While measures can be put in place to minimise risks of cheating or collusion, there is always a possibility someone will cheat when an examination is conducted online. This is indicated by many studies showing that students often perform better in unsupervised online examinations compared to supervised exam environments.[45–47] Research has shown though that the use of remote proctoring features and a restricted browser can help to uphold online OSCE integrity.[20]

Due to the positive student response to this initiative, a video-recorded online OSCE opportunity was since added as an optional activity into the 4th year of this university's pharmacy degree. The study findings and the valuable student feedback should help inform educators about using such an OSCE initiative in their programmes (with adjustments where needed), and highlight to students the benefits overall in participating where possible. It would be prudent though to consider how this could be less resource-intensive

for universities to enhance its long-term sustainability. One suggestion could be to incorporate more peer involvement, which is becoming increasingly prevalent in OSCEs.[48] Notably though, our study found that students had mixed feelings on peers viewing their video recording, similarly noted by Mak et al. for pharmacy students.[49] Given the learning benefits associated with peer observation and feedback,[50–53] which were acknowledged by some study respondents, it is important that these benefits are communicated to future students in advance whilst also ensuring appropriate steps are taken to minimise student concerns, such as inappropriate sharing of recordings. Future initiatives could also consider incorporating near-peer involvement in video-recorded OSCEs; this was welcomed by students and has been shown to be valued by near-peer learners, feasible and complementary to faculty teaching, and helpful in improving both preparation and perceived performance in future examinations.[54,55]

Strengths and limitations

This study was limited by its participation and response rates. Whilst OSCE participation was not compulsory for the module, these low rates may also be partly explained by the delay in receiving ethics committee approval, which moved the OSCE closer to students' examination period. Therefore, students may have been busy preparing for examinations, making them less inclined to participate.

Self-selection bias should also be acknowledged, whereby it may have been the case that more motivated students were over-represented. Students who may benefit most from this formative OSCE, such as those with lower confidence or performance, may have been less likely to participate – thus affecting generalisability of the findings. Future studies with larger sample sizes would allow for analysis to investigate how student characteristics may affect their views or performance with such an initiative.[11] Despite this low sample size in survey responses, students provided rich detailed answers. Whilst social desirability bias could be possible given that students knew their facilitator was a School-affiliated pharmacist, it remains unlikely given that survey responses remained anonymous.

The positive results may have been influenced by volunteer bias and because it was students' first time undertaking an OSCE; therefore, this enthusiasm could be attributed to its novelty for them, rather than specifically towards the online or recorded elements. To evaluate more closely the impact of individual elements, future research may need to compare different arms (e.g. in-person recorded OSCE versus online recorded OSCE).

Conclusion

This study shows that the use of video-recorded online OSCEs are beneficial to pharmacy students as part of formative assessment. The results obtained, including rich insights from students, suggest that video recording OSCEs can be an effective learning tool. Students found the experience helpful to enhance both their clinical and communication skills, and welcomed the integration of similar initiatives. This research highlights the added value in video-recording OSCEs to create evidence of student performance and inform future practice, and therefore innovations like this should be considered for increased use in training programmes for healthcare students going forward.

Financial disclosure statement and funding

The authors have no relevant financial disclosures and the project received no funding.

Contribution to literature

This study is filling an important research gap, as it is the first to have explored the views of undergraduate pharmacy students undertaking a formative video-recorded OSCE online which involves a synchronous interaction with a simulated patient. Pharmacy student participants perceived this to be an effective learning tool, and this study has shown the added value in video-recording OSCEs to create evidence of student performance and inform their future practice. This research highlights that innovations like this should be considered for increased use in healthcare training programmes, not just for pharmacy students, and may be particularly useful for distance learning programmes where only online assessment is possible.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The authors would like to express sincere thanks to the students and pharmacist facilitators who participated in this initiative, especially to the students who provided their rich insights in the survey based on their experience.

Appendices. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.cptl.2025.102447.

References

1. Austin Z, Gregory P, Tabak D. Simulated patients vs. standardized patients in objective structured clinical examinations. *Am J Pharm Educ*. 2006;70(5):119. https://doi.org/10.5688/aj7005119.
2. Urteaga EM, Attridge RL, Tovar JM, Witte AP. Evaluation of clinical and communication skills of pharmacy students and pharmacists with an objective structured clinical examination. *Am J Pharm Educ*. 2015;79(8):122. https://doi.org/10.5688/ajpe798122.
3. Chong RLK, Chan ASE, Chua CMS, Lai YF. Telehealth interventions in pharmacy practice: systematic review of reviews and recommendations. *J Med Internet Res*. 2025;27, e57129. https://doi.org/10.2196/57129.
4. DiVall MV, Hayney MS, Marsh W, et al. Perceptions of pharmacy students, faculty members, and administrators on the use of technology in the classroom. *Am J Pharm Educ*. 2013;77(4):75. https://doi.org/10.5688/ajpe77475.
5. Durand E, Kerr A, Kavanagh O, Crowley E, Buchanan B, Bermingham M. Pharmacy students' experience of technology-enhanced learning during the COVID-19 pandemic. *Explor Res Clin Soc Pharm*. 2023;9, 100206. https://doi.org/10.1016/j.rcsop.2022.100206.
6. Kakadia R, Chen E, Ohyama H. Implementing an online OSCE during the COVID-19 pandemic. *J Dent Educ*. 2020;85(suppl 1):1006–1008. https://doi.org/10.1002/jdd.12323.
7. Mak V, Krishnan S, Chuang S. Students' and examiners' experiences of their first virtual pharmacy objective structured clinical examination (OSCE) in Australia during the COVID-19 pandemic. *Healthcare*. 2022;10(2):328. https://doi.org/10.3390/healthcare10020328.
8. Mort JR, Hansen DJ. First-year pharmacy students' self-assessment of communication skills and the impact of video review. *Am J Pharm Educ*. 2010;74(5):78. https://doi.org/10.5688/aj740578.
9. Lust E, Moore FC. Emotional intelligence instruction in a pharmacy communications course. *Am J Pharm Educ*. 2006;70(1):6. https://doi.org/10.5688/aj700106.
10. Dy-Boarman EA, Diehl B, Mobley-Bukstein W, Bottenberg MM, Bryant GA, Sauer H. Comparison of faculty and student self-assessment scores of aseptic technique skills and the impact of video review on self-awareness for second-year pharmacy students. *Curr Pharm Teach Learn*. 2018;10(2):201–205. https://doi.org/10.1016/j.cptl.2017.10.021.
11. Chiau TP. Video recording feedback in communication and counselling among pharmacy students. Is it better than verbal feedback? *Indian J Pharm Educ Res*. 2016;50(2):246–250. https://doi.org/10.5530/ijper.50.2.4.
12. Hanya M, Yonei H, Kurono S, Kamei H. Development of reflective thinking in pharmacy students to improve their communication with patients through a process of role-playing, video reviews, and transcript creation. *Curr Pharm Teach Learn*. 2014;6(1):122–129. https://doi.org/10.1016/j.cptl.2013.09.009.
13. Volino LR, Das RP. Video review in self-assessment of pharmacy students' communication skills. *J Educ Learn*. 2014;3(4):26–36. https://doi.org/10.5539/jel.v3n4p26.
14. Jin HK, Park SH, Kang JE, et al. The influence of a patient counseling training session on pharmacy students' self-perceived communication skills, confidence levels, and attitudes about communication skills training. *BMC Med Educ*. 2019;19(1):172. https://doi.org/10.1186/s12909-019-1607-x.
15. Hytönen H, Näpänkangas R, Karaharju-Suvanto T, et al. Modification of national OSCE due to COVID-19 - implementation and students' feedback. *Eur J Dent Educ*. 2021;25(4):679–688. https://doi.org/10.1111/eje.12646.
16. Savage A, Minshew LM, Anksorus HN, McLaughlin JE. Remote OSCE experience: what first year pharmacy students liked, learned, and suggested for future implementations. *Pharmacy*. 2021;9(1):62. https://doi.org/10.3390/pharmacy9010062.
17. Chan SCC, Choa G, Kelly J, Maru D, Rashid MA. Implementation of virtual OSCE in health professions education: a systematic review. *Med Educ*. 2023;57(9):833–843. https://doi.org/10.1111/medu.15089.
18. Sturpe DA, Huynh D, Haines ST. Scoring objective structured clinical examinations using video monitors or video recordings. *Am J Pharm Educ*. 2010;74(3). https://doi.org/10.5688/aj740344.
19. Tan JY, Ma IWY, Hunt JA, et al. Video recording in veterinary medicine OSCEs: feasibility and inter-rater agreement between live performance examiners and video recording reviewing examiners. *J Vet Med Educ*. 2021;48(4):485–491. https://doi.org/10.3138/jvme-2019-0142.
20. Deville RL, Fellers CM, Howard ML. Lessons learned pivoting to a virtual OSCE: pharmacy faculty and student perspectives. *Curr Pharm Teach Learn*. 2021;13(11):1498–1502. https://doi.org/10.1016/j.cptl.2021.06.046.
21. McLaughlin JE, Dean MJ, Mumper RJ, Blouin RA, Roth MT. A roadmap for educational research in pharmacy. *Am J Pharm Educ*. 2013;77(10):218. https://doi.org/10.5688/ajpe7710218.
22. Kolb D. Experiential Learning: Experience as the Source of Learning and Development. FT press; 2014.
23. Tsingos C, Bosnic-Anticevich S, Smith L. Reflective practice and its implications for pharmacy education. *Am J Pharm Educ*. 2014;78(1):18. https://doi.org/10.5688/ajpe78118.
24. Ogrinc G, Armstrong GE, Dolansky MA, Singh MK, Davies L. SQUIRE-EDU (standards for QUality improvement reporting excellence in education): publication guidelines for educational improvement. *Acad Med J Assoc Am Med Coll*. 2019;94(10):1461–1470. https://doi.org/10.1097/ACM.0000000000002750.
25. Lim AS, Lee SWH. Is technology enhanced learning cost-effective to improve skills?: the Monash objective structured clinical examination virtual experience. *Simul Healthc J Soc Simul Healthc*. 2022;17(2):131–135. https://doi.org/10.1097/SIH.0000000000000526.
26. Mookherjee S, Strujik J, Cunningham M, Kaplan E, Çoruh BA. Independent and mentored video review of OSCEs. *Clin Teach*. 2019;16(1):23–29. https://doi.org/10.1111/tct.12755.
27. Beal JL, Weber ZA, Isaacs AN, Illingworth Plake KS, Zillich A, Woodyard JL. Pharmacy student perceptions and preferences of in-person versus video-recorded evaluations in skills-based courses. *Am J Pharm Educ*. 2020;84(11):7976. https://doi.org/10.5688/ajpe7976.
28. Awaisu A, Abd Rahman NS, Nik Mohamed MH, Bux Rahman Bux SH, Mohamed Nazar NI. Malaysian pharmacy students' assessment of an objective structured clinical examination (OSCE). *Am J Pharm Educ*. 2010;74(2):34. https://doi.org/10.5688/aj740234.
29. Awaisu A, Mohamed MHN, Al-Efan QAM. Perception of pharmacy students in Malaysia on the use of objective structured clinical examinations to evaluate competence. *Am J Pharm Educ*. 2007;71(6):118. https://doi.org/10.5688/aj7106118.
30. Branch C. An assessment of students' performance and satisfaction with an OSCE early in an undergraduate pharmacy curriculum. *Curr Pharm Teach Learn*. 2014;6(1):22–31. https://doi.org/10.1016/j.cptl.2013.09.006.
31. Elnaem MH, Wahab MZI, Ali AM, et al. Pharmacy students' views on the objective structured clinical examination (OSCE): findings from two Malaysian universities. *Pharm Educ*. 2021;21:39–44. https://doi.org/10.46542/pe.2021.211.3944.
32. Salih MRM, Bahari MB, Azhar S, et al. Pharmacy student perceptions and feedback on the modified objective structured clinical examination. *Pharm Educ*; 2010:10. https://pharmacyeducation.fip.org/pharmacyeducation/article/view/357/325.
33. Hsieh HF, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res*. 2005;15(9):1277–1288. https://doi.org/10.1177/1049732305276687.
34. O'Mahony E, Kenny J, Hayde J, Dalton K. Development and evaluation of pharmacist-provided teach-back medication counselling at hospital discharge. *Int J Clin Pharm*. 2023;45(3):698–711. https://doi.org/10.1007/s11096-023-01558-0.
35. Kerr A, Kelleher C, Pawlikowska T, Strawbridge J. How can pharmacists develop patient-pharmacist communication skills? A realist synthesis. *Patient Educ Couns*. 2021;104(10):2467–2479. https://doi.org/10.1016/j.pec.2021.03.010.
36. Hussin V. Student and teacher reflections on indirectness as a pragmatic feature of pharmacist–patient simulations. *Engl Specif Purp*. 2013;32(2):110–121. https://doi.org/10.1016/j.esp.2013.01.001.
37. Paul S, Dawson KP, Lanphear JH, Cheema MY. Video recording feedback: a feasible and effective approach to teaching history-taking and physical examination skills in undergraduate paediatric medicine. *Med Educ*. 1998;32(3):332–336. https://doi.org/10.1046/j.1365-2923.1998.00197.x.
38. Ozcakar N, Mevsim V, Guldal D, et al. Is the use of videotape recording superior to verbal feedback alone in the teaching of clinical skills? *BMC Public Health*. 2009;9:474. https://doi.org/10.1186/1471-2458-9-474.
39. Fitzpatrick KL, Allen EA, Griffin BT, O'Shea JP, Dalton K, Bennett-Lenane H. Exploring career choices of pharmacy graduates over 15 years: a cross-sectional evaluation. *Curr Pharm Teach Learn*. 2024;16(5):307–318. https://doi.org/10.1016/j.cptl.2024.02.010.

40. Dalton K, Fleming A, O'Mahony D, Byrne S. Factors affecting physician implementation of hospital pharmacists' medication appropriateness recommendations in older adults. *Br J Clin Pharmacol*. 2022;88(2):628–654. https://doi.org/10.1111/bcp.14987.
41. Hsia SL, Zhou C, Gruenberg K, Trinh TD, Assemi M. Implementation and evaluation of a virtual objective structured clinical examination for pharmacy students. *JACCP J Am Coll Clin Pharm*. 2021;4(7):837–848. https://doi.org/10.1002/jac5.1448.
42. Terry C, Cain J. The emerging issue of digital empathy. *Am J Pharm Educ*. 2016;80(4):58. https://doi.org/10.5688/ajpe80458.
43. Kiehl C, Simmenroth-Nayda A, Goerlich Y, et al. Standardized and quality-assured video-recorded examination in undergraduate education: informed consent prior to surgery. *J Surg Res*. 2014;191(1):64–73. https://doi.org/10.1016/j.jss.2014.01.048.
44. Baticulon RE, Sy JJ, Alberto NRI, et al. Barriers to online learning in the time of COVID-19: a National Survey of medical students in the Philippines. *Med Sci Educ*. 2021;31(2):615–626. https://doi.org/10.1007/s40670-021-01231-z.
45. Dendir S, Maxwell RS. Cheating in online courses: evidence from online proctoring. *Comput Hum Behav Rep*. 2020;2, 100033. https://doi.org/10.1016/j.chbr.2020.100033.
46. Daffin LW, Jones AA. Comparing student performance on proctored and non-proctored exams in online psychology courses. *Online Learn*. 2018;22(1):131–145. https://doi.org/10.24059/olj.v22i1.1079.
47. Brallier SA, Schwanz KA, Palm LJ, Irwin LN. Online testing: comparison of online and classroom exams in an upper-level psychology course. *Am J Educ Res*. 2015;3(2):255–258. https://doi.org/10.12691/education-3-2-20.
48. Khan R, Payne MWC, Chahine S. Peer assessment in the objective structured clinical examination: a scoping review. *Med Teach*. 2017;39(7):745–756. https://doi.org/10.1080/0142159X.2017.1309375.
49. Mak V, Malone D, Karunaratne N, Yao W, Randell L, Vu T. A video-based reflective design to prepare first year pharmacy students for their first objective structured clinical examination (OSCE). *Healthcare*. 2022;10(2):280. https://doi.org/10.3390/healthcare10020280.
50. Cushing A, Abbott S, Lothian D, Hall A, Westwood OMR. Peer feedback as an aid to learning–what do we want? Feedback. When do we want it? Now!. *Med Teach*. 2011;33(2):e105–e112. https://doi.org/10.3109/0142159X.2011.542522.
51. Lee CB, Madrazo L, Khan U, Thangarasa T, McConnell M, Khamisa K. A student-initiated objective structured clinical examination as a sustainable cost-effective learning experience. *Med Educ Online*. 2018;23(1):1440111. https://doi.org/10.1080/10872981.2018.1440111.
52. Young I, Montgomery K, Kearns P, Hayward S, Mellanby E. The benefits of a peer-assisted mock OSCE. *Clin Teach*. 2014;11(3):214–218. https://doi.org/10.1111/tct.12112.
53. Sader J, Cerutti B, Meynard L, et al. The pedagogical value of near-peer feedback in online OSCEs. *BMC Med Educ*. 2022;22(1):572. https://doi.org/10.1186/s12909-022-03629-8.
54. Taylor D, Quick S. Students' perceptions of a near-peer objective structured clinical examination (OSCE) in medical imaging. *Radiogr Lond Engl 1995*. 2020;26(1):42–48. https://doi.org/10.1016/j.radi.2019.06.009.
55. de Menezes S, Premnath D. Near-peer education: a novel teaching program. *Int J Med Educ*. 2016;7:160–167. https://doi.org/10.5116/ijme.5738.3c28.