Abstract

Objective: This study's primary aim is to assess the use of different types of standardized patients (SPs) during formative simulation activities on summative objective structured clinical exams (OSCE) in a PharmD curriculum.

Methods: Randomized-controlled study with first-year pharmacy students in a Pharmacist Patient Care Lab (PCL) course. Students were randomized into groups with either hired actors or their peers as SPs for virtual simulation activities. All students then completed a virtual teaching OSCE (TOSCE) and virtual OSCE. A mixed effects analysis was done to compare TOSCE and OSCE scores between the two groups.

Results: There were no significant differences between the two groups in their TOSCE or OSCE scores for the analytical and global rubrics.

Conclusion: This study demonstrates that peers may be as effective as having hired actors as SPs in preparing students for virtual skills exams.

Introduction

As pharmacy education has a growing interest in competency-based education, authentic learning and assessment activities are recommended to motivate students and prepare them for practice.1,2 One assessment activity proven to be effective in evaluating the performance of healthcare professionals is the Objective Structured Clinical Examination (OSCE).3 Standardized patients (SPs) are an integral part of OSCE encounters. The role of SPs is to accurately and consistently portray the medical background, physical condition, and emotional state of a given patient in a planned encounter. Challenges of hiring actor SPs, including cost, training, and logistics, have led some programs to use student peers as SPs or limit the number of their simulation activities altogether.4-6

Existing studies compare outcomes from different active learning activities to OSCEs, the cost-effectiveness of hiring SPs, and outcomes of specific patient care skills using SPs (e.g., communication, motivational interviewing).4,7-14 However, there are no published randomized-controlled studies comparing OSCE outcomes when using peer versus hired actor SPs in telemedicine simulation activities in a Doctor of Pharmacy (PharmD) curriculum.3,9-13,15 With the shift to telemedicine and online education due to the COVID-19 pandemic, incorporating virtual simulations into the pharmacy curriculum aligns with the future of healthcare. As the use of OSCE and competency-based education matures within pharmacy education, it is essential to establish best practices surrounding simulations.

The Chapman University School of Pharmacy (CUSP) curriculum includes a Pharmacist Care Lab (PCL) course series which includes simulations and teaching OSCEs (TOSCE) to help students practice their patient care skills in preparation for OSCEs. TOSCEs are a formative assessment tool that mimic an OSCE to provide feedback to students while familiarizing them with the format of an OSCE.16 CUSP does not use SPs for simulation encounters but uses SPs for TOSCEs and OSCE. Simulations currently use peer role-playing activities. This study's primary aim is to assess the use of SPs versus peer role-playing during formative simulation activities on OSCEs in a Pharm.D. curriculum. We hypothesize that students who participate in the more authentic simulation scenarios involving actors will perform better in their OSCE because they must perform under similar scenarios with “patients” unfamiliar to them.

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### 2. Methods

CUSP is a 3-year Pharm.D program comprised of six didactic trimesters over two years and a year of advanced pharmacy practice experiences. A two-station OSCE is conducted at the end of each didactic trimester. This prospective, randomized-controlled study was conducted with first-year students from the class of 2023 during their first trimester. The study was incorporated into the PCL course at CUSP. Students were stratified by gender, incoming grade point average (GPA), and prior community pharmacy work experience. They were then randomized into two groups: the control group (Peer Group), which did not have any simulation activities with actor SPs, and the intervention group (SP Group), which conducted all their simulation activities with actor SPs. SPs hired for this study are all professional working actors who have worked with other health professions professionals in the area.

Each group had two telemedicine simulation encounters, a TOSCE, and an OSCE. These sessions were conducted on SimulationIQ (Education Management Solutions, Exton, PA) and recorded using the Zoom teleconferencing software (Zoom Video Communications, Inc.; San Jose, CA). The peer group was paired up with a peer to role-play the same simulation case twice, taking turns alternating the pharmacist and patient role. Before the encounter, students received a brief pharmacist prompt and patient script. In the SP group, students were randomly assigned to one of three SPs who portrayed the patient in each simulation. The first simulation case was on immunizations and the second was drug counseling for a new prescription medication.

The TOSCE utilized six SPs, and students in both groups were randomly assigned to one of these SPs for one case on drug counseling. Students participated in a full class debrief with PCL faculty after each simulation and the TOSCE. The OSCE utilized six SPs and students in both groups were randomly assigned to one of three SPs who portrayed the patient in each simulation. The two simulations were conducted three weeks apart, and the TOSCE and OSCE cases were conducted one week apart. The simulations, TOSCE, and OSCE cases were similar in complexity. Case topics were not disclosed to the students until ten minutes before their encounter. See Fig. 1 for the study design.

Video recordings of the TOSCE and OSCE were graded asynchronously by four pharmacy practice faculty. To ensure consistency in grading, the faculty graded a sample of four TOSCE encounters together and came to a consensus for each rubric item. The four graders were then placed into two pairs and the pairs graded a randomized set of TOSCE and OSCE encounters together. Pairs were blinded to which study arm students were assigned. If items of contention arose, the two graders within a pair discussed the item until a scoring agreement was reached.

The outcome measurements included a student’s score on the analytical rubric and the global rubric for the TOSCE and OSCE case performances. The analytical and global rubric were developed in-house at the institution by a group of faculty and cases were standard set using the Angoff Method. The analytical rubric assesses the student’s completion of tasks required for the case, and the global rubric assesses the student’s ability to collect information, empathy, listening skills, communication techniques, and non-verbal skills. The analytical rubric and global rubric for both cases were scored out of 25 points and 16 points, respectively.

#### 2.1. Statistical Analysis

All statistics were performed using the R Project for Statistical Computing version 3.6.1.

Analysis of variance (ANOVA) tests were run to consider the influence of graders on the scores of both the Analytic Total and the Global Total. The score was the dependent variable and the three grader pairs and the peer and the SP groups for gender, pharmacy work experience, or GPA. All statistics were performed using the R Project for Statistical Computing version 3.6.1.

Post hoc analysis for the mixed effects model was performed using estimated marginal means with a Tukey correction for repeated comparisons.

This study was approved by the Chapman University Institutional Review Board; IRB #: 1415H151.

### 3. Results

Eighty-two students were included in the final analysis, with 42 in the Peer Group and 40 in the SP group. Four students were not included in the final analysis due to either missing the OSCE event or technical difficulties leading to their encounter not being recorded. Groups were well matched, and no significant differences were found between the peer and the SP groups for gender, pharmacy work experience, or GPA. The average scores of each group are displayed in Table 1 by rubric and type of assessment.

![Figure 1](image-url)  
**Fig. 1.** Project design. OSCE = objective structured clinical exams; TOSCE = teaching OSCE, P1 = first professional year, SP = standardized patient.
There was no significant influence between the pairs of graders on the analytical scores, but there was a significant influence on the global scores ($F_{(2,159)} = 3.462, p = 0.0338$). A Tukey post hoc test showed that one pair of graders differed from the other pair and from when all the graders graded a sample of encounters together, ($p = 0.046$ and $p = 0.045$, respectively). Due to the influence of the grader on the global scores, the grader was included in the model for determining differences in scores between groups (SPs vs. Peer) and types of assessments (TOSCE vs. OSCE). The mixed effects analysis for the global scores showed a difference between the assessments, with the OSCE analytical scores being higher than the TOSCE analytical scores ($F_{(1,78.001)} = 81.2072, p < 0.0001$). However, no differences were found for the grader, the group, or the interaction between the group and type of assessment.

The mixed effects analysis for the global scores showed a difference between the assessments, with the TOSCE global scores being higher than the OSCE global scores ($F_{(1,79.196)} = 51.9244, p < 0.0001$). As in the ANOVA, the inter-variability between the grader pairs was also significant ($F_{(2, 120.551)} = 5.0568, p < 0.01$). There were no differences between the group, or the interaction for the group and type of assessment.

4. Discussion

This study sought to identify the relationship between simulations with SPs versus simulations with peers on TOSCE and OSCE performance scores. Both simulation methods resulted in similar scores on the analytical and global rubrics for virtual TOSCE and OSCE assessments. It was also noted that both groups performed significantly higher on the global rubric during the TOSCE and higher on the analytical rubric during the OSCE.

Our results, for telemedicine activities, are similar to studies in other health professional programs that evaluate student performance in-\textit{person} based on SPs or role-playing. In medical students, SPs and role-playing produced similar skill attainment on smoking cessation topics.\textsuperscript{27} Another smoking cessation study examining peer role-play and SP teaching methods reported equivalent OSCE scores regardless of whether SPs provided better self-confidence.\textsuperscript{28}

In nursing programs, infection control training comparing SPs versus role-playing, exhibited statistically significant increases in knowledge, awareness of standard precaution, and infection control performance for both groups with no differences between the groups.\textsuperscript{29}

The benefits of role-playing should not be underestimated. In a study by Luiz Adrian JA, et al., using only student role-playing with no SPs demonstrated improved oral and written communication skills.\textsuperscript{30} They also incorporated individual faculty feedback on each student's role-playing performance, which our study did not. Student perception of usefulness of role-playing were primarily positive in post-evaluations and course teaching strategy evaluations, though students may prefer SP interactions.\textsuperscript{31,32} Ultimately, role-playing provides an opportunity for students to apply what they learned and practice, producing better skills outcomes.\textsuperscript{32}

Unexpected findings from this study were that both groups had higher analytical scores on the OSCE than the TOSCE, and both groups had higher global scores on the TOSCE than the OSCE. A possible explanation for this outcome is based on the different objectives and expectations for a TOSCE versus an OSCE. The purpose of a TOSCE is to provide students with feedback and practice for an OSCE. The TOSCE encounters with the SPs are used for formative purposes in the curriculum and are not part of their course grade.\textsuperscript{33} In this ungraded activity, students may be less concerned about figuring out the “right answer” to the case, and more about their global performance and communication skills.

Limitations of this study include implementation in an online environment, which may have contributed to a ceiling effect that prevented the ability to detect changes between groups. Virtual assessments do not allow for all the necessary steps to ensure standard exam security protocols, and students may have had access to additional resources or assistance during the encounters, allowing them to perform better than under standard exam security protocols. The quick turnaround time between the TOSCE and OSCE may not have provided enough time to detect a difference in scores. The generalizability of this study is also limited to pharmacy drug counseling scenarios which lend itself to a more standardized format. Performance in other pharmacy practice scenarios and settings may not produce the same results and could be explored in future studies. The virtual and telemedicine environment results may also not be generalizable to in-person encounters.

5. Conclusion

Pharmacy students scored similarly on analytical and global rubrics for a telemedicine drug counseling OSCE case, regardless of whether they practiced with an SP or role-played with their peers. This study demonstrates that peer role-playing may be as effective as having actor SPs, suggesting more work will need to be done in this area to develop best-practices and methods for training peers to be SPs. Follow-up studies measuring different outcomes or skills can help determine if there are specific topics or pharmacy practice skills that a peer SP may be optimal. It is also worth looking at how these two methods may impact evaluations and performance outside the classroom, such as on experiential rotations and as licensed pharmacists.

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CRediT authorship contribution statement

\textbf{Bach Albert:} Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Supervision, Writing – original draft, Writing – review & editing. \textbf{Bethishou Laressa:} Data curation, Investigation, Project administration, Writing, Writing – review & editing. \textbf{Beuttler Richard:} Data curation, Formal analysis, Methodology, Writing – review & editing. \textbf{Fakourfar Neeloufar:} Data curation, Project administration, Writing – review & editing, Investigation. \textbf{Rao Hindu:} Data curation, Project administration, Writing – review & editing, Investigation.

Table 1

<table>
<thead>
<tr>
<th></th>
<th>Analytical Rubric Points</th>
<th></th>
<th>Global Rubric Points</th>
<th></th>
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<tbody>
<tr>
<td></td>
<td>TOSCE (SD)</td>
<td>OSCE (SD)</td>
<td>TOSCE (SD)</td>
<td>OSCE (SD)</td>
</tr>
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<td>Peer group</td>
<td>17.00 (2.75)</td>
<td>18.95 (2.51)</td>
<td>12.64 (3.53)</td>
<td>10.74 (3.49)</td>
</tr>
<tr>
<td>SP group</td>
<td>15.95 (3.02)</td>
<td>18.61 (2.51)</td>
<td>13.18 (4.23)</td>
<td>10.03 (3.49)</td>
</tr>
</tbody>
</table>

OSCE = objective structured clinical exams, TOSCE = teaching OSCE.
References