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Effectiveness of an Adapted Virtual Medication Reconciliation OSCE Compared with In Person OSCE

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Introduction

Transitions of care (TOC) is defined as "the movement of patients between health care practitioners, settings, and home as their condition and care needs change" (The Joint Commission, 2012). Changes in medications often come with changes in care, increasing the risk of medication-related problems (MRPs). A recent systematic review found a 53% and 50% prevalence in medication errors and unintentional medication discrepancies, respectively, in adults discharged from hospitals (Alqenae et al., 2020). Medication reconciliation is defined as "the process of identifying the most accurate list of all medications that the patient is taking, including name, dosage, frequency, and route, by comparing the medical record to an external list of medications obtained from a patient, hospital, or other provider" (Center for Medicare and Medicaid Services, 2015). Several reviews have highlighted the effectiveness of pharmacist-led interventions at reducing medication-related problems during TOC process, however the quality of evidence is low (Mekonnen et al., 2016; Renaudin et al., 2016; McKay et al., 2019; Redmond et al., 2018).

Educating and assessing student pharmacists on the TOC process, specifically how to conduct and document medication reconciliation, aligns with pharmacy education outcomes and entrustable professional activities (EPAs) for entry-level graduates (Medina et al., 2013; Pittenger et al., 2016). The objective structured clinical examination (OSCE) has been employed in pharmacy education to assess student competence in various skills needed to perform accurate and effective medication reconciliation (Urteaga et al., 2015; Aranda et al., 2019; Salinitri et al., 2012). Traditionally, OSCEs are conducted in person; however, COVID-19 radically changed pharmacy education delivery causing institutions to adapt to remote learning and alternate forms of assessment. Would such an adaption diminish a student's ability to learn, practice and competently perform tasks like medication reconciliation? If true, then far larger problems would come to light because the OSCE is considered to be the "gold standard" for assessing clinical competence.

The medical literature is sparse on the use of virtual or remote OSCEs to evaluate student competency and is largely limited to medical and postgraduate nursing students (Quinlin et al., 2020; Sartori et al., 2019; Lara et al., 2020). Virtual OSCEs have been developed and implemented to assess learner telehealth skills (Quinlin et al., 2020; Sartori et al., 2019). However, many faculty do not have time to create completely new OSCEs from scratch and have resorted to the revision of previous OSCE assessments with the hope of maintaining the same quality and effectiveness as when delivered in person. A recent study explains how a traditional, high-stakes live OSCE was adapted to a virtual OSCE and no significant differences were observed when comparing the virtual mean scores and pass rates with live OSCE scores from the past (Lara et al., 2020). To our knowledge, no published studies have formally assessed pharmacy students using an adapted, virtual OSCE. The objective of this study was to measure virtually-based OSCE pass rates of student pharmacists who received remote, synchronous instruction on medication reconciliation compared with OSCE pass rates from the previous class, who received face to face synchronous instruction and OSCEs. The secondary objective was to measure student perceptions of remote instruction and OSCE preparation.

Materials and Methods

OSCE Preparation
The instruction was delivered to 2nd year student pharmacists in a 4-year program as part of a laboratory course focused on developing pharmacist-specific professional skills. Instructional content to prepare for the OSCE was scheduled over four lab periods as summarized in Table 1.

Table 1. Remote Instruction Type, Content and Activities for OSCE Preparation

Lab Name	Instruction Type Time	Activity	Feedback
Medication Reconciliation Foundations	Asynchronous 15 minutes	Individual Pre-recorded presentation	None
Medication Reconciliation Foundations	Synchronous 60 minutes	Small Group ACS Case (written)	Large Group Debriefing
Medication Reconciliation Practice	Synchronous 60 minutes	Individual HFrEF Case (w/ SP)	Individual Written
Medication Reconciliation Practice	Synchronous 60 minutes	Large Group	Large Group Debriefing
Transitions of Care OSCE	Synchronous 180 minutes	Small Group 1 of 4 cases	Small & Large Group Debriefing

OSCE=Objective Structured Clinical Examination
ACS=Acute Coronary Syndrome
HFrEF=Heart Failure with Reduced Ejection Fraction
SP=Standardized Patient

All components of the course were delivered in person in previous years, but preparation for remote delivery began in March 2020 due to COVID-19.   This was the only fundamental change as the course content and faculty involved in the OSCE were the same as in 2019 when it was administered in person. For this OSCE, students traditionally are presented with a single patient at one of four TOC settings: the emergency room, inpatient hospitalization, community pharmacy, or ambulatory care clinic. In each setting, the student is expected to identify and intervene appropriately on a major MRP, with each setting having a unique problem, and complete a prioritized medication-related problem list using the ASHP Clinical Skills Competition Pharmacist Care Plan (American Society of Health Systems Pharmacists, n.d.). With the transition to remote learning, all activities were held online including four synchronous preparatory labs and the OSCE. For the labs, students first practiced completing a medication reconciliation via written case and submitted one completed Pharmacist Care Plan per group, followed by an online debriefing. All case information provided to students for each preparatory lab mimicked the scheduled OSCE and included patient information, discharge summaries, and home medication lists. The following week, students individually interviewed a standardized patient (SP) online and submitted a second Pharmacist Care Plan. Rubric evaluations of the submissions were completed along with written feedback. One week later, a debriefing session with the entire class was held to discuss common themes observed with the submitted Pharmacist Care Plans and to review OSCE logistics and instructions.   As students entered the virtual environment to complete their final preparatory lab, each small group received one of four unique patient virtual home visit cases with a different disease state [i.e., coronary artery disease (CAD), heart failure with reduced ejection fraction (HFrEF), chronic obstructive pulmonary

disease (COPD), and mechanical mitral valve with atrial fibrillation). There were multiple MRPs in each case, with each case having one MRP which would impact patient mortality. Faculty roamed between the remote breakout rooms to field questions and concerns. During the lab debrief, faculty discussed primary, secondary, and tertiary issues defined in each case. Students were informed that identifying the primary/ life-threatening MRP was required to pass the OSCE. Failing to identify this MRP represented a "kill point" and automatic failing grade. For purposes of the study, a student passed the OSCE if successful on the first attempt or after one remediation attempt. Any student failing after two attempts was defined as failing the OSCE. The OSCE was patterned exactly as the final preparatory lab with the addition of a SP interview component and was completed individually rather than in small groups.

OSCE Assessment and Remediation
On the day of the OSCE, students were provided with a link to an online room for an SP interview and a separate room for documentation of their problem lists and medication reconciliation forms. Each SP was assigned only one case, and students were randomly assigned an SP. Students were given 20 minutes to review case information before their OSCE, 20 minutes for the SP interview and 30 minutes for documentation. No electronic drug information resources were allowed during the OSCE. Fourth-year pharmacy students were used to observe the interview and documentation encounters, provide technical support, and ensure academic integrity. Once students completed their problem lists and medication reconciliation documentation, these documents were uploaded to a learning management system and graded via a rubric in real-time by the faculty member who authored the assigned case. Any failing submission was then reviewed by the other three faculty members on the OSCE team for agreement and consistency. The primary outcome of comparing the OSCE pass rates was chosen for this study since the objective of an OSCE is to assess student competency against predetermined criteria. Any student who received a failing grade on the OSCE was notified via email and scheduled for remediation the next day. No formal disease state-related feedback was provided to the student before remediation. On remediation day, students were assigned a different case and repeated the same process. Afterwards, an asynchronous debrief was recorded discussing not only strategies for evaluating medication therapy appropriateness, but also on the specific details for each case with evidence from supporting guideline documents.

Post OSCE
Students submitted a short reflection following the OSCE debrief, detailing student perceptions of successes and opportunities for improvement on the OSCE and overall impressions. A brief 10-item survey created by the researchers, designed to measure student perceptions of online learning and training to perform medication reconciliation, was sent to students via email the day after the OSCE and again one week later. Descriptive statistics of the survey results and the comparison of OSCE pass rates using Chi Square was analyzed by SPSS Statistics version 26.0 (IBM Corp., Armonk, NY). The study received an exemption approval by the university's institutional review board.

Results

Seventy-seven students completed the OSCE and overall pass rates were similar between the 2020 and 2019 (n=76) class years (97% vs 94%, respectively; p = 0.24). Survey response rate was 43% (n=33) and the majority of students (69%) had never performed or observed a medication reconciliation before the course (Table 2).

Table 2. Student Demographics and Baseline Characteristics (n=33)

Age in years (mean + SD)	23.7 + 3.6
Sex (%)	
Male	34
Female	66
Prior Experience (%)	
Performed Med Rec Before Course	12
Observed Med Rec Before Course	19
Never Performed/Observed Before Course	69

While the remote instruction was effective and students learned new material (78.8% strongly agree or agree), the majority felt unprepared (54.5%) and lacked confidence (63.6%) going into the OSCE (Table 3). An overwhelming majority (81.8%) reported they preferred face-to-face learning rather than online and a minority (36.4%) described their current online learning environments (e.g., home or residence) as conducive to learning.

Table 3. Student Perceptions of Virtual Medication Reconciliation Training and OSCE (n=33)

Item	SA/A (%)	Neutral (%)	D/SD (%)
I learned about the components involved with medication reconciliation	78.8	15.2	6.0
The online training I received prepared me for the medication reconciliation OSCE	45.5	21.2	33.3
The online lab activities related to medication reconciliation were engaging	48.5	24.2	27.3
I feel confident I can complete all components of a medication reconciliation OSCE (e.g., SP interview, identifying medication-related problems, documenting)	42.2	36.4	21.2
I felt confident I would pass the medication reconciliation OSCE	36.4	15.2	48.4
I prefer online and virtual labs compared to face-to-face traditional labs	18.2	21.2	60.6
My learning environment (e.g., home, residence) during this experience was conducive to online learning	36.4	24.2	39.4

SA=Strongly Agree   SD=Strongly Disagree
A=Agree   OSCE=Objective Structured Clinical Examination
D=Disagree   SP=Standardized Patient

Reflection paper comments included positive and critical themes. Positively, students found the experience rewarding and confirms their learning from other courses. Notably, many students had underestimated how much pharmacotherapy knowledge they had retained during their first two years of didactic instruction. Interestingly, while also commenting on the high-stress nature of the OSCE, students appreciated the experience and suggested incorporating more similar experiences in the curriculum. Negatively, they requested the ability to utilize drug information resources during the OSCE and have more time to review documents prior to the OSCE.

Discussion

COVID-19 presented an unprecedented challenge at many colleges and universities across the country. During this time, the faculty were able to transition to a fully online interface, but the concern was that a revised online platform would impact quality and compromise learning so more students would fail the OSCE than those in previous years. Therefore, it was decided to compare pass rates pre- and post-online delivery to measure effectiveness of the revised delivery of the curriculum. Compared to the 2019 class, the overall OSCE pass rates for the 2020 class were similar suggesting the transition did not significantly hinder student's ability to succeed on the OSCE and confirmed the online platform was at least as effective. Furthermore, the survey allowed faculty to elicit more in-depth feedback from students on their impression of the OSCE experience. The baseline characteristics of the participants revealed what was expected of student pharmacists in their 3rd professional year. In general, the majority had never observed or completed a medication reconciliation prior to the OSCE experience, and this was a new task. This led to some of the worry expressed in other survey answers, as they voiced a need for more training and lacked confidence that they could successfully complete a medication reconciliation task, indicating high anxiety. Only approximately one-third of respondents were confident they would pass the OSCE. While it may be tempting to focus on reducing student anxiety, previous research has concluded high anxiety is not associated with OSCE pass rates and efforts should be focused more on improving pass rates rather than on reducing anxiety (Longyhore 2017). Confidence can be increased with more practice and these observations were also expressed in the debrief sessions. Finally, the overwhelming majority of students voiced a preference for in-person learning versus online learning, with many students citing a learning environment that was not conducive to learning as the rationale for their preference. While student perceptions are important and need to be acknowledged and addressed, the outcome of the study also revealed similar effectiveness of OSCE pass rates indicating the vast majority of the students are competent in the vitally important task of performing a medication reconciliation.

Looking forward, this experience has highlighted an opportunity for more intentional inclusion of telemedicine into the pharmacy curriculum. Not only is this a growing setting by which providers interact with patients, but pharmacists are uniquely positioned to provide telemedicine based on their availability and training. Incorporating training in telemedicine would not only bolster student confidence with online learning, but would also allow them to further differentiate themselves in the job market. While this study sheds important light on the viability and success of an online OSCE experience, it is not without limitations. Most notably, the OSCE case revision means the cases were not identical to previous years. The survey used to collect student responses was non-validated, had a relatively low response rate and is subject to selection bias.

Conclusion

COVID-19 has caused a transition to online learning and assessment including OSCEs. In our study, virtually-based medication reconciliation OSCE pass rates were similar to in person OSCE pass rates from a previous year. Therefore, the remote online instruction and assessment was at least as effective though the virtual platform was not preferred by learners. Potential future research could be focused on how to best balance in-person with virtual instruction in preparation for OSCEs and how to improve the online learning environments for students.

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