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Providing Remote Students with Access to a Video-Enabled Standardized Patient Simulation on Interprofessional Competencies and Late-Life Depression Screening

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Abstract

Background Standardized patient (SP) simulation is used to teach geropsychiatry. This project tested feasibility and effectiveness of video-enabled SP simulation to teach interprofessional (IP) late-life depression screening.

Methods and findings Nurse practitioner, pharmacy, and medical students ($N = 177$) participated in remote ($n = 27$) and on-site ($n = 150$) SP simulation. Linear mixed-effect model determined the effects of time and setting on pretest and posttest Interprofessional Education Collaborative Competencies Attainment Survey (ICCAS) data. Overall, no significant difference was observed in degree of change on ICCAS domains, indicating both modalities produced equally beneficial outcomes. Small sample size and focus on late-life depression screening limits generalizing results.

Conclusions Video-enabled SP simulations can be incorporated to prepare students with IP competencies for late-life depression screening.

Keywords Remote monitoring; Standardized patient simulation; Distance learner; Late-life depression

Introduction

Simulations in healthcare education are widely used in clinical and interprofessional competencies [1,2,3,4]. However, there is little research on implementing standardized patient simulations to prepare health professionals in the fields of study for geriatrics and gerontology. Across disciplines, faculty and students face limited access to standardized patient simulation learning experiences that address interprofessional education when caring for older adults at risk for late-life depression [5,6].

Innovative technology connecting participants in rural areas to campus-based simulation opportunities is a vital way to develop interprofessional competencies across settings [7]. Without this technology, faculty are faced with incurring inconvenience, training expenses [6], and travel costs to transport faculty, students, equipment, and standardized patients. When faced with such limitations, faculty may

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devise alternative learning experiences that, while well intentioned, are not as thorough or effective.

Studies [1,4,8] show that learning outcomes on simulation training that integrate interprofessional competencies to teach geriatrics and gerontology improve the quality of care for older adults. However, it is unknown if students who participate in a simulation with video-enabled technology experience learning outcomes comparable to on-site participants. The purpose of this project was to test the feasibility and effectiveness of implementing video-enabled technology to allow students to participate in a simulation focused on late-life depression screening.

Methods

Design

A pretest-posttest design was used to evaluate students' self-reported interprofessional collaborative competencies. Results were analyzed before and after participating in a standardized patient simulation focused on screening for depression in older adults. Groups were compared based on how they accessed the simulation, either on-site or through video-enabled technology.

Sample

After approval by the university's Institutional Review Board, nurse practitioner, pharmacy, and medical students ($N = 177$) participated in the simulation (see Figure 1 and Figure 2) and completed the pretest-posttest survey. Interprofessional student teams participated in a total of four traditional on-site-only encounters with a standardized patient (SP) simulation ($n = 150$). There were two SP simulations with remote-access-only participants through interactive video simulation ($n = 27$). In all simulations, three to five students were selected for the interview team and up to 30 students served as active observers and were asked to make recommendations on interprofessional competencies during the SP encounter (see Figure 1). To ensure the interprofessional structure of the student interview teams, faculty assigned teams at all on-site and remote locations (see Table 1).

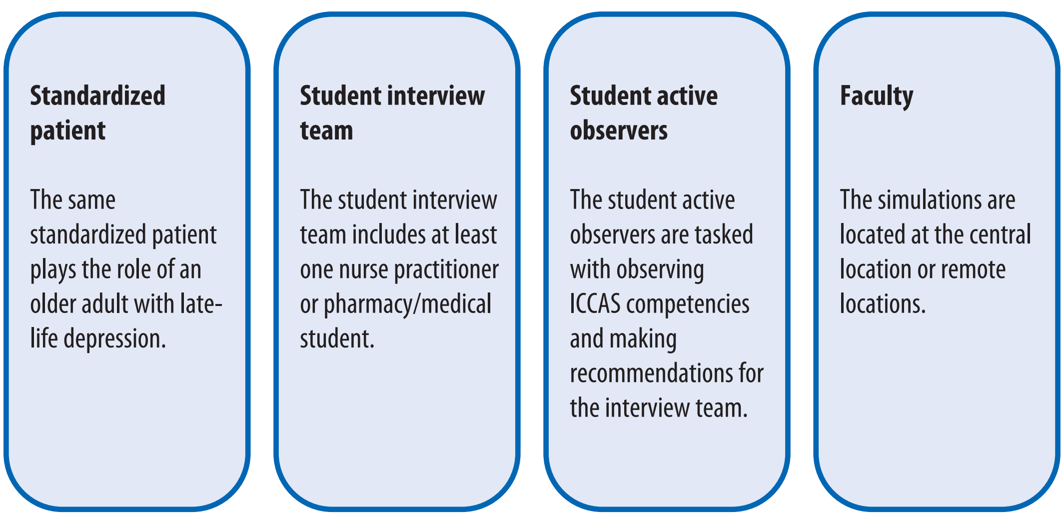

Figure 1: Simulation roles

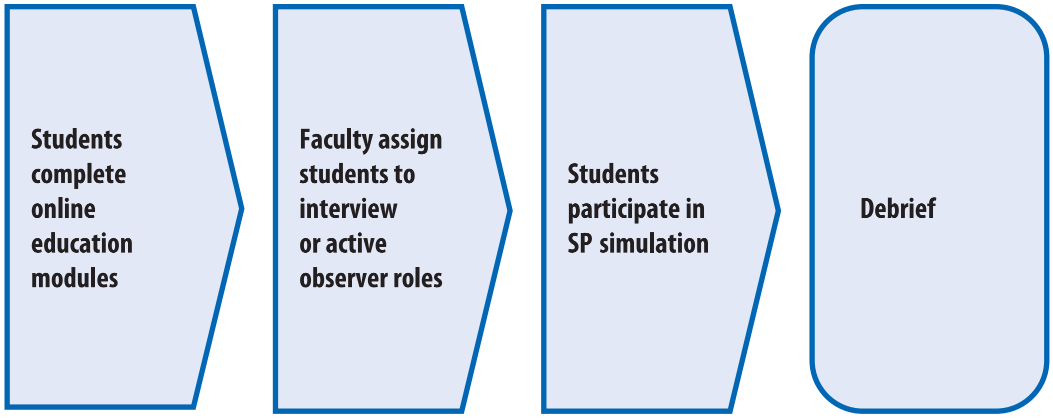

Figure 2: SP simulation experience

Table 1: Simulation type and technology access mode for SP simulation experiences

Simulation type	Location & technology access for team members				
	SP	Student interview teams	Student observers	Faculty*	Debrief
On-site SP^ simulation	Central simulation laboratory	Central simulation laboratory	Central classroom monitor	Central classroom monitor	SP: Central classroom
					Students: Central classroom
					Faculty: Central classroom
Video-enabled remote SP simulation	Central simulation laboratory	Remote classroom monitor	Remote classroom monitor	Central classroom monitor and remote classroom monitor	SP: Central classroom monitor
					Students: Remote classroom monitor
					Faculty: Central and remote classroom monitor

Notes: *Faculty locations are central or remote; ^Morning and afternoon simulations offered on the same date were counted as one simulation

Procedures

A pilot simulation evaluated the feasibility of offering remote students technology-enabled access to the simulation. This simulation included seven nurse practitioner and two pharmacy students who participated on-site. Seven nurse practitioners, four pharmacy students, and one student whose profession was not reported participated remotely through interactive video. These students' data were excluded from the final analysis.

The study simulation experiences were categorized and analyzed according to the six dates that the simulations were offered over two semesters (see Table 1). Faculty used all simulations to introduce interprofessional competencies regarding screening for late-life depression to students for the first time in their graduate education experiences. Nurse practitioner students attended as part of the Advanced Health Assessment class, and pharmacy and medical students attended during their geriatric rotations. Prior to participating in the simulation, students reviewed a three-part series of faculty-developed online modules that introduced interprofessional competencies and approaches for late-life depression screening in older adults, pharmacotherapy for depression, and geriatric mental health disparities.

During all six simulations, the same standardized patient with acting experience assumed the role of Emma Jean Martin, a widow in her 70s with multiple chronic illnesses. She self-managed hypertension, gastro-oesophageal reflux, type 2 diabetes, and chronic back pain (from a previous surgery), and she had a six-month history of vague complaints of abdominal pain and sleeplessness. An extensive diagnostic work-up was negative. Interprofessional student teams reviewed the patient's chart before entering the room. The chart included documentation of two clinic visits and one emergency department visit, as well as results of laboratory work and diagnostic studies.

A faculty member posed as Ms. Martin's primary care provider and presented an overview of the case for the student team. The primary care provider reiterated that diagnostic testing was negative, the physical exam was normal, and it was only necessary to interview Ms. Martin. The importance of input from the interprofessional team was emphasized.

Students either assumed a role as a member of the interprofessional interview team or were active observers and were asked to make recommendations on interprofessional competencies during the SP encounter (see Figure 1). The interview team, comprised of three to five students, was tasked to interview the patient, formulate a working diagnosis, and provide a management plan for Ms. Martin. At a minimum, each interview team included nurse practitioner and pharmacy students. A medical student was included in the interview team for the simulations they attended. After entering the patient's room, the team had approximately 15 minutes to complete the interview and diagnosis, and to develop a management plan. The interview team focused on: 1) using an interprofessional approach to screen for depression, 2) recognizing that the patient is at the centre of the interprofessional team, and 3) involving the patient in developing an effective management plan.

Students who were not part of the interview team participated as active observers. Active student observers were divided into panels. Each panel was assigned to assess a specific competency by using the Interprofessional Collaborative Competencies Attainment Survey (ICCAS, [10]) to evaluate the interview team's interprofessional effectiveness. During the interview debrief, active observers provided feedback on the four major interprofessional competencies: values and ethics, roles and responsibilities, interprofessional communication, and teamwork.

In two of the simulations, all of the participants were remotely located and attended using the program's video-enabled technology. These students were in one room and accessed the simulation together as a group (through a single video-enabled encounter). Participants in the remaining four simulations assumed their roles at the actual site of the standardized patient. For all six simulations, the standardized patient was in a room emulating a clinic setting. Faculty and student observers watched the interviews "live" on a monitor located in a room separate from the standardized patient. Video-enabled technology captured, transmitted, and projected the student interview team onto remote or on-site monitors. Remotely located interprofessional interview teams interacted with the standardized patient through video transmission.

Following the simulation, faculty led a 30-minute debrief. Debriefing protocols for participants (on-site or remote) were the same. The student interview team and observers discussed how each of the interprofessional core competencies was demonstrated and how they could improve in the future. Faculty and the standardized patient then provided additional feedback and recommendations. Students completed the pretest prior to the start of the simulation and the posttest after debriefing (see Figure 2).

Interprofessional Collaborative Competencies Attainment Survey

The ICCAS is a valid and reliable self-rating instrument measuring competencies in communication, collaboration, roles and responsibilities, collaborative patient/family-centred approach, conflict management/resolution, and team functioning [9]. Twenty items were scored on a seven-point Likert scale, ranging from strongly disagree to strongly agree. Pretest and posttest results were from the same instrument and therefore matched.

Learner's evaluation: Case-based scenario

A faculty-developed survey called the Learner's Evaluation: Case-Based Scenario survey was used to collect data post simulation. This tool was comprised of the following two open-ended questions: 1) Elaborate on aspects of the session (e.g., format, content, teaching/learning methods, debriefing) you found most valuable; and 2) Provide specific suggestions for improving the delivery of the course (e.g., course content, materials, teaching methods, debriefing). Demographic questions were included in this instrument.

Data management

Surveys were assigned unique identifiers created by the student. Surveys without identifiers were assigned one. Surveys were also categorized according to each simulation-designated number, which indicated how each participant accessed the simulation (on-site or remote/video-enabled). Independent variables were site and time. Dependent variables were average scores in each subscale of the ICCAS six variables pretest and posttest.

Data analysis

Linear mixed-effects models were fit in order to evaluate the effects of the simulation and site on each of the ICCAS domain scores. Specifically, each ICCAS domain score was modelled as a function of the interaction of time (pre versus post simulation) and site (on-site versus remote participant), with a subject-specific random intercept to account for within-person correlation in scores over time. Models were estimated using restricted maximum likelihood (REML) with the Kenward-Roger [11], adjustment for small sample size and unbalanced data. Mean ICCAS domain scores for on-site and remote participants before and after the simulation were derived from fitted models and we performed statistical tests of 1) change in ICCAS scores over time, 2) differences in ICCAS scores between groups, and 3) the time by site interaction. All analyses were conducted using Stata 15 [12].

Results

The sample included 115 nurse practitioner students, 25 pharmacy students, and 34 medical students; three participants did not identify their profession (see Table 2). To accommodate scheduling issues, students could participate in the simulation in one of two capacities: either on-site or with video-enabled technology. However, for those in a remote area, all students assembled in one single place and then accessed the simulation through the video technology as a group. Each simulation will henceforth be referred to by the way in which students attended, either "remote" or "on-site." The four on-site simulations included 12, 41, 41, and 56 students (N = 150). The two remote simulations included 10 and 17 students (n = 27). All six simulations included nurse practitioner and pharmacy students. Three of the on-site and one remote simulation included medical students within the interview team.

Table 2: Students by site

Profession	Remote	On-site
Nurse practitioner	16 (59.3%)	99 (66.0%)
Pharmacy	9 (33.3%)	16 (10.7%)
Medicine	2 (7.4%)	32 (21.3%)
Not reported		3 (2.0%)
Total	27	150

Table 3: Results by site

	Remote			On-site		
ICCAS variable	Mean pre simulation	Mean post simulation	Sig	Mean pre simulation	Mean post simulation	Sig
Communication	5.579	6.467	0.00	5.855	6.637	0.00
Collaboration	5.593	6.630	0.00	5.931	6.639	0.00
Roles & responsibilities	5.620	6.565	0.00	5.856	6.636	0.00
Collaborative patient/family-centred approach	5.506	6.497	0.00	5.871	6.578	0.00
Conflict management/ resolution	5.815	6.501	0.00	6.087	6.685	0.00
Team functioning	5.451	6.519	0.00	5.671	6.611	0.00

For both the remote and on-site groups, significant increases were observed in all ICCAS domain scores when comparing pre- and post-simulation data (see Table 3). Increases in post-simulation ICCAS scores ranged from 0.71 to 0.94 in the on-site groups and from 0.89 to 1.07 in the remote groups ($p < .001$ for all pre-post comparisons). There were some significant differences in ICCAS domain scores between students participating remotely versus on-site prior to the simulation (see Table 4), with remote students having significantly lower pre-simulation collaboration (mean difference = .34 points, p = .024) and Collaborative Patient/Family-Centred Approach (CPFCA; mean difference = .36, p = .024) scores. There were no significant differences in ICCAS scores between remote and on-site students post simulation. While there was a general trend of a greater increase in post-simulation scores in the remote group, the time-by-site interaction only reached statistical significance for the ICCAS collaboration score, with the post-simulation increase in score being 0.32 points higher among remote students compared to on-site students (p = 0.047).

Table 4: Comparison of groups

ICCAS variable	Site pre simulation	Site post simulation	Time *site
Communication	$p = 0.070$	$p = 0.257$	$p = 0.493$
Collaboration	$p = 0.024$*	$p = 0.952$	$p = 0.047$*
Roles & responsibilities	$p = 0.115$	$p = 0.632$	$p = 0.325$
Collaborative Patient/family-centred approach	$p = 0.024$*	$p = 0.562$	$p = 0.123$
Conflict management/resolution	$p = 0.080$	$p = 0.213$	$p = 0.669$
Team functioning	$p = 0.208$	$p = 0.593$	$p = 0.473$

Note: * Indicates statistical difference between groups

There were two requested subjective responses on the Learner's Evaluations: Case-Based Simulation Survey: 1) Elaborate on aspects of the session (e.g., format, content, teaching/learning methods, debriefing) you found most valuable; and 2) Provide specific suggestions for improving the delivery of the course (e.g., course content, materials, teaching methods, debriefing). Although the students were not asked to comment on the ICCAS variables, students consistently elaborated on the competencies in their own words:

> [The] collaborative approach is the best!
>
> I enjoyed the collaborative debriefing.
>
> [I] loved the communication on how we can improve.

An active observer commented that "being able to watch the group do the activity" was beneficial. Roles and responsibilities were also important to many students. For example, one shared, "I found respect between the disciplines rewarding." Several student comments valued the team, specifically in terms of "experience," "dynamics," "communication," and "team building with different professions." One student said that "learning how to roll with resistance" was an important aspect of the simulation.

Both remote and on-site participants appreciated the realism of the clinical setting and the authentic role of the patient throughout the simulation. One student said, "It is amazing to work with a live person and interact with my care team." A remote student said, "I appreciated the role the standardized patient played … it was like we were discussing with an actual patient."

Students also offered suggestions to improve the simulation, such as, "Include someone playing an RN [registered nurse]." One remote student stated, the "standardized patient in person … not in telecom … may offer even better insight." Overall, data analysis on the ICCAS variables and the Learner's Evaluation: Case-Based Scenario survey was consistently positive on interprofessional competencies, regardless of participants' mode of access.

Discussion

The standardized patient in this study participated in routine training to maintain quality assurance across on-site and remote modes of access. The methods for this project were consistent with another study on using telehealth to care for older adults [3]. The current study provides additional evidence for using telehealth to screen for depression in rural older adults. Even though faculty anticipated that students would initially perceive technology as a barrier, the ICCAS scores show that students were engaged in maintaining patient-centred care.

This study was unique in that the faculty-developed learner's evaluation questionnaire provided an extra layer of inquiry and insight into student learning outcomes. For example, while the tool did not ask questions about the ICCAS variables for interprofessional competencies, students voluntarily commented on ICCAS variables with a high degree of consistency. This unexpected outcome reinforces the hypothesis that students identified with the experience of providing patient-centred care regardless of how they accessed the simulation learning activity, and the technology served as a facilitator to fulfilling that challenge.

The video-enabled remote standardized patient simulation was designed to benefit distance learners by offering a way to access high-quality learning activities at a major medical university's interprofessional education centre. The consequent expansion in access allowed faculty to maintain a focus on developing realistic, case-based scenarios related to geriatrics and gerontology. In this particular project's focus on interprofessional late-life depression screening, faculty concentrated on an important and immediately useful health topic for pre-professionals serving patients in rural areas.

Limitations

This project was limited by a lack of randomization and the small sample size at one institution. Findings for students from different professions were not evaluated separately due to the small number of medical students participating remotely. In addition, the year of program was requested but only reported by 42 percent of participants; therefore, this was not considered as an independent variable. Graduate students may not have the same exposure to interprofessional simulations addressing rural older adults with late-life depression. In future projects, interview teams, observers, standardized patients, and faculty from varied disciplines can be interviewed and studied to gain multiple perspectives on how to best facilitate interprofessional-based simulations that are accessed both on-site or with video-enabled technology.

Conclusion

In addition to promoting the acquisition of interprofessional competencies, integrating technological innovation has the potential to help educational institutions overcome geographic-related barriers to learning. This innovative application of technology can also minimize the isolation of older adults and access to rural health practitioners, decrease provider shortages, and it can possibly increase interest in geriatrics and geriatric mental health at the pre-professional stage. By keeping simulations at a single location and allowing students a remote-access option, faculty can avoid the costs of transporting a simulation and simultaneously assure a measure of educational quality. Integrating innovative technology into a standardized simulation may be an effective way for faculty to expand an educational resource's reach and impact. If remotely based students can make the same strides in learning interprofessional competencies as on-site students, faculty can devote their time to designing powerful simulations that address complex and urgent health issues of disparate populations, such as caring for the mental health of older adults in rural areas.

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