INSTRUCTIONAL DESIGN AND ASSESSMENT

Using Communication Technology to Enhance Interprofessional Education Simulations

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Objective. To determine the impact of simulations using an alternative method of communication on students' satisfaction, attitudes, confidence, and performance related to interprofessional communication.

Design. One hundred sixty-three pharmacy students participated in a required applications-based capstone course. Students were randomly assigned to one of three interprofessional education (IPE) simulations with other health professions students using communication methods such as telephone, e-mail, and video conferencing.

Assessment. Pharmacy students completed a validated survey instrument, Attitude Toward Healthcare Teams Scale (ATHCTS) prior to and after course participation. Significant positive changes occurred for 5 out of 20 items. Written reflection papers and student satisfaction surveys completed after participation showed positive themes and satisfaction. Course instructors evaluated student performance using rubrics for formative feedback.

Conclusion. Implementation of IPE simulations using various methods of communication technology is an effective way for pharmacy schools to incorporate IPE into their curriculum.

Keywords: interprofessional, communication, simulation, technology, alternative

INTRODUCTION

The value of interprofessional collaborative practice is increasingly recognized, so national competencies have been developed in the United States to facilitate the delivery of interprofessional education (IPE) within the academic curriculum. This report links the future of our health and education systems to the transformative promise of a "collaborative practice-ready health workforce."¹ The World Health Organization defines IPE as students from two or more professions learning about, from, and with each other to enable effective collaboration and improve health outcomes.² Interprofessional communication is a critical skill for providing quality team-based care to patients, especially because poor interprofessional communication has been linked to medical errors.^{3,4} While face-to-face communication is important, members of an interprofessional team will use various communication technologies (electronic messaging, telephone, video-conferencing) as team-based health care evolves.¹ Observational evidence from hospitals revealed dysfunctional interprofessional communication patterns,

with many opportunities for improvement including the use of technology.^{5,6}

Limited data address approaches for teaching and assessing alternative interprofessional communication methods using technology. The authors define alternative interprofessional communication methods as any type of communication that does not involve live, face-to-face interaction and includes the use of a communication technology (eg, telephone, e-mail). Research exploring alternative interprofessional communication methods that use smartphones and electronic messaging focuses on practicing physicians and nurses with mixed results.⁷⁻⁹ To our knowledge, no literature exists that focuses on alternative methods of communication with practicing or student pharmacists as part of an interprofessional health care team.

These simulations involving alternative methods of communication used the Interprofessional Education Collaborative (IPEC) core competencies and focused on the domain of interprofessional communication as the curricular design framework.¹ Furthermore, the simulations fulfilled the Accreditation Council for Pharmacy Education (ACPE) Standards and the Center for the Advancement of Pharmaceutical Education (CAPE) Outcomes by requiring students to participate in an interprofessional education activity using an experiential-based

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active-learning method.^{10,11} The objective of the study was to determine the impact of the alternative methods of communication simulations on students' attitudes, confidence, and performance related to interprofessional communication and collaboration. The secondary objective was to assess student satisfaction with the new simulations.

DESIGN

The University of Kansas (KU) offers a 4-year doctor of pharmacy (PharmD) degree to 170 students per class divided between two campuses. The main campus is in Lawrence, Kansas (150 students per class), and the regional campus is in Wichita, Kansas (20 students per class). Both campuses offer the same didactic curriculum via synchronous video conferencing. Laboratory activities are taught separately on each campus following the same content structure, but can vary slightly in methods of delivery. The School of Pharmacy is the only health professions school on the Lawrence campus, with the other professional schools being located on the University of Kansas Medical Center (KUMC) campus in Kansas City, Kansas. The two campuses are approximately 40 miles apart, which creates a barrier to incorporating pharmacy students into face-to-face IPE simulations.

Clinical Assessment is a required, 2-credit hour applications-based course offered to third-year pharmacy students in the spring semester. The course provides a capstone experience to students prior to their participation in advanced pharmacy practice experiences. Students participate in a variety of weekly activities using active-learning strategies including the use of standardized patients. Prior to this course, students do not participate in required activities related to interprofessional education.

Three simulations using technology were integrated into the course to focus on interprofessional communication. Learning objectives of the simulations were to: (1) discuss roles and responsibilities of other health professions (and one's own) as they relate to patient care; (2) demonstrate use of communication techniques to facilitate discussions to enhance team function; and (3) engage other health professionals using teamwork principles to deliver patient-centered care. The three simulations included Telephone SBAR (Situation, Background, Assessment, and Recommendation), MTM (Medication Therapy Management) in Community Pharmacy, and Online Transition of Care (TOC). Because there was a larger number of pharmacy students available compared to other professional students, pharmacy students were assigned to one of three simulations to ensure each student could participate in an interprofessional simulation. A computer-generated randomization process

was used to assign each student to one of three simulations. Students were required to complete their simulation to receive pass/fail credit for the course. Student performance was evaluated, however this was only used for formative assessment purposes to provide students feedback for improvements in the future.

The Telephone SBAR simulation included nursing and pharmacy students collaborating on a variety of patient scenarios (n=76 pharmacy students). Students used telephone technology and the SBAR communication method to convey information.¹² The simulation created communication from three pharmacy settings (community, ambulatory care, and inpatient) to the corresponding nurse settings (primary care and inpatient). After dividing into groups, each pharmacy student selected a patient case scenario and communicated recommendations using the SBAR format to the nursing student. The nursing students assessed the recommendations and returned the call to the pharmacy student to make a final care decision. Every pharmacy student had the opportunity to complete at least one case with a nursing student.

The MTM Community Pharmacy simulation included medical and pharmacy students collaborating on an MTM session performed in the community setting following a patient's discharge from the hospital (n=45 pharmacy students). Medical students completed a simulation a week prior during the same patient's hospital admission. After the simulation, pharmacy students divided into groups to develop a prescriber letter and list of recommendations, which was sent to a medical student via e-mail. The medical and pharmacy students communicated through e-mail to develop a final interprofessional care plan.

The Online TOC simulation included interprofessional student teams consisting of dietetics, nurse practitioner, occupational therapy, and pharmacy students (n=43 pharmacy students). A patient case was created using a simulated electronic health record (EHR) and an audio recording for a patient ready to transition from hospital to home care. Each student was instructed to view the EHR, listen to the recorded patient interview performed by a standardized practitioner in their profession, and compose a uniprofessional (ie, one health profession) SOAP (subjective, objective, assessment and plan) note in the EHR. The students then decided on a time to conduct an interprofessional team meeting using synchronous video conference technology. After, they developed a final interprofessional care plan in the EHR. Further description of the simulations can be seen in Table 1.

Demographic and rubric performance data were analyzed using descriptive statistics. The differences in mean between presurvey and postsurvey results were

Table 1. Logistics of Alternative Communication Simulations

Simulation	Telephone SBAR	MTM Community	
		Pharmacy	Online Transition of Care
Professions Involved	Pharmacy (n=76) Nursing (n=24)	Pharmacy (n=45) Medicine (n=10)	Pharmacy (n=43) Nurse Practitioner (n=37) Occupational Therapy (n=29) Dietetics (n=16)
Interprofessional Team Structure	3 pharmacy students 1 nursing student	4-5 pharmacy students 1 medical student	2-3 pharmacy students 1 nurse practitioner student 1 occupation therapy student 1 dietary student (not available for all groups)
Pharmacy Setting	Community, ambulatory care, and inpatient	Community	Inpatient
Communication Technology Used	Telephone	E-mail	Electronic Health Record (Cerner) Video (Adobe Connect)
Debriefing Session	Video-conference 30 minutes in duration Facilitated by faculty members	None	Video-conference 30 minutes in duration Facilitated by an assigned student in each group
Total time for Completion	2 hours	3 hours	5 hours

SBAR=Situation, Background, Assessment and Recommendation

MTM=Medication Therapy Management

analyzed for significance using the Mann-Whitney U test (vassarstats.net, Poughkeepsie, NY). This project was determined exempt by the university's institutional review board.

A mixed-methods approach to assessment using both quantitative and qualitative evaluation was used for this study. Pharmacy students completed the Attitude Toward Healthcare Teams Scale (ATHCTS), which was administered on the first week (presurvey) and last week (post-survey) of the course. Students were asked to voluntarily and anonymously respond to the questions using a 5-item Likert scale (1=strongly disagree to 5=strongly agree). The 20-item validated scale evaluated three factors: quality of care, costs of team care, and physician centrality.¹³ Student satisfaction with the interprofessional simulation was collected immediately following each simulation, using an anonymous 5-question survey with a 5-item Likert scale (1=strongly disagree to 5=strongly agree) and two open-ended questions. After the simulation was completed, student performance was evaluated by faculty members or peers using evaluation rubrics that assessed clinical content and interprofessional communication content. For the Telephone SBAR simulation, students completed peer assessments using an existing rubric from a college of nursing program modified by the investigators.¹⁴ The rubric assessed students' interprofessional communication using the SBAR method. For the Online TOC and the MTM Community Pharmacy simulation,

a rubric was developed by the three faculty investigators evaluating the patient transition of care plan. The uniprofessional (pharmacy) care plan was compared to the interprofessional (team including the pharmacy student) care plan.

Students were required to write a brief guided reflection about their experience in the interprofessional simulation. The four student investigators individually reviewed the de-identified reflections to identify qualitative themes and later convened to reach a consensus for the common topics noted in the reflection papers. A similar approach was used for the open-ended satisfaction survey questions. Additionally, the student investigators quantitatively evaluated the reflections to determine the frequency of common themes.

EVALUATION AND ASSESSMENT

One hundred sixty-three students were enrolled in the Clinical Assessment course. The majority of students were female (69%) with ages ranging from 21 to 40 years old, with five students older than 40 years. Of the student respondents, 27% participated in a prior interprofessional education experience.

Of the 163 students, 138 (85%) and 132 (81%) completed the ATHCTS surveys before and after the course, respectively. Overall, students demonstrated positive attitudes at baseline as evidenced by their presurvey Likert scores. Significant positive changes occurred for 5 out of

the 20 questions ($p < 0.05$). All significant changes occurred for survey items analyzing the factor of quality of care. Results of the ATHCTS surveys are shown in Table 2.

One hundred sixty students (98%) completed the satisfaction survey. Students reported being satisfied, as demonstrated by the mean score of 4.1 to the question “Overall this interprofessional activity was a valuable learning experience.” Student satisfaction results are

presented in Table 3. The open-ended questions included in the satisfaction survey were lessons learned from the interprofessional simulation that may apply to future practice and other comments related to the learning activity. Themes reported by more than 50% of students for lessons learned for future practice included organization of thoughts before communicating with other health care professionals, and the value of pharmacists and other health care team members as part of patient-centered

Table 2. Attitude Toward Healthcare Teams Scale (ATHCTS), n=138 (pre)/132(post)

Questions	Presurvey, Mean ^a (SD)	Presurvey, Median ^a	Postsurvey, Mean ^a (SD)	Postsurvey, Median ^a	p value ^b
1. Working on teams unnecessarily complicates things most of the time.	1.1 (1.0)	1	1.1 (1.1)	1	0.30
2. The team approach improves the quality of care to patients.	4.6 (0.6)	5	4.6 (0.7)	5	0.29
3. Team meetings foster communication among team members from different disciplines.	4.3 (0.8)	4	4.5 (0.7)	5	0.035
4. Physicians have the right to alter patient care plans developed by the team.	3.1 (1.1)	3	3.2 (1.2)	3	0.57
5. Patients receiving team care are more likely than other patients to be treated as whole persons.	4.0 (1.1)	4	4.5 (0.7)	5	<0.001
6. A team's primary purpose is to assist the physician in achieving treatment goals for patients.	3.6 (1.2)	4	3.5 (1.2)	4	0.38
7. Working on a team keeps most health professionals enthusiastic and interested in their jobs.	3.9 (0.9)	4	4.0 (0.9)	4	0.48
8. Physicians, as a rule, are team players.	2.5 (1.2)	2	2.8 (1.1)	3	0.054
9. Developing a patient care plan with other members avoids errors in delivering care.	4.1 (0.9)	4	4.2 (0.9)	4	0.43
10. Health professionals working on teams are more responsive than others to the emotional and financial needs of patients.	3.5 (1.0)	3	3.8 (0.9)	4	0.011
11. The team approach permits health professionals to meet the needs of family caregivers as well as patients.	3.8 (0.9)	4	4.0 (0.8)	4	0.042
12. The physician should not always have the final word in decisions made by health care teams.	3.0 (1.3)	3	3.3 (1.2)	3	0.064
13. The give and take among team members help them make better patient care decisions.	4.2 (0.9)	4	4.2 (0.9)	4	0.542
14. Hospital patients who receive team care are better prepared for discharge than other patients.	4.1 (0.8)	4	4.3 (0.8)	5	0.006
15. The physician has the ultimate legal responsibility for decisions made by the team.	2.8 (1.2)	3	2.5 (1.2)	3	0.051
16. In most instances, the time required for team meeting could be better spent in other ways.	1.6 (1.1)	1	1.5 (1.2)	1	0.39
17. Physicians are natural team leaders.	2.6 (1.1)	3	2.5 (1.2)	3	0.45
18. The team approach makes the delivery of care more efficient.	3.9 (0.9)	4	4.0 (1.0)	4	0.17
19. Developing an interdisciplinary patient care plan is excessively time consuming.	2.2 (1.0)	2	2.1 (1.3)	2	0.29
20. Having to report observations to the team helps team members better understand the work of other health professionals.	4.4 (0.8)	5	4.5 (0.7)	5	0.435

^aResponses rated on Likert scale (1=strongly disagree to 5=strongly agree)

^bValues were calculated using the Mann-Whitney U test

Table 3. Interprofessional Simulation Student Satisfaction Results^a

Questions	Overall ^b (n=160)	Telephone SBAR ^b (n=74)	MTM Community Pharmacy ^b (n=42)	Online Transition of Care ^b (n=44)
1. Overall, this interprofessional activity was a valuable learning experience.	4.1 (0.8)	4.2 (0.8)	4.1 (0.7)	4.0 (1.0)
2. Learning/participating with other professional students was valuable.	4.4 (0.8)	4.6 (0.7)	4.1 (0.9)	4.3 (0.8)
3. This learning activity enhanced my appreciation of the value of interprofessional teamwork.	4.2 (0.9)	4.4 (0.8)	3.9 (1.0)	4.1 (0.9)
4. This learning activity increased my knowledge of another profession.	3.8 (1.1)	3.9 (1.0)	3.2 (1.0)	4.1 (1.0)
5. This learning activity improved my knowledge and/or skills in interprofessional communication.	4.1 (1.0)	4.3 (0.9)	3.8 (1.0)	4.0 (1.0)

^aResponses rated on Likert scale (1=strongly disagree to 5=strongly agree)

^bMean scores (standard deviation)

SBAR=Situation, Background, Assessment and Recommendation; MTM=Medication Therapy Management

team. Themes for other comments were the enjoyment in educating other health care professionals about the role of pharmacists in patient care. Constructive themes included the extensive time commitment and technology issues (specific for the Online TOC simulation) and lack of immediate feedback related to patient care plans.

The guided reflection questions evaluated: (1) attitudes towards interprofessional communication using technology [rather than face-to-face interaction]; (2) confidence with interprofessional communication skills; (3) attitudes and knowledge regarding roles and interprofessional collaboration [pharmacy's role and other's role]; and (4) behavior change as a result of interprofessional collaboration during the simulation. One theme included the benefits gained from using technology for interprofessional communication. Students reported feeling that technology "helped close the gap between practice settings" and promoted better quality of care. Overall, more than 80% of students reported feeling the simulations reinforced the role and value of the pharmacist. Students stated that their pharmacy recommendations to other team members demonstrated knowledge of disease states and medications. A final theme that emerged in more than 80% of students was confidence gained in interprofessional communication. Students felt the simulation helped demonstrate "how important it is to work as an entire team to achieve a common goal."

Regarding student performance, the Telephone SBAR simulation peer assessments demonstrated a mean score of 9.5 out of 12 points for each student. For the MTM Community Pharmacy simulation, the mean score on the uniprofessional care plan (out of 13) increased from 8.4 (SD=1.3) to 9.5 (1.2) on the interprofessional care plan. Similarly, the care plans for the Online TOC

simulation (out of 12) increased from an average score of 7.6 (1.3) to 10.9 (1.4) following interprofessional collaboration. Faculty time for developing the IPE simulations was extensive. In addition, successfully creating these IPE simulations required collaboration with faculty members from other colleges. An estimated average of 35 hours of faculty time was needed to develop all three interprofessional simulations. The number of faculty facilitators necessary for each simulation varied. The Telephone SBAR simulation used four facilitators each day (total of nine hours/week for each facilitator). The MTM Community Pharmacy simulation used two facilitators each day (total of nine hours/week for each facilitator). The Online TOC simulation did not need any faculty facilitators. Resources such as standardized patients, learning technologies, and cost also varied with each simulation. The Telephone SBAR simulation was the least resource intensive; no expensive technology or standardized patients were used. The MTM Community Pharmacy simulation used standardized patients (nine for the week), which was a significant cost. The Online TOC simulation used an EHR and synchronous online video-conferencing technologies. These resources were available at no cost to our school but could be a significant investment for programs that do not have access to such resources through their university.

DISCUSSION

Incorporating interprofessional simulations within a required course benefited students. The simulations fulfilled pharmacy accreditation standards and the IPEC competency domain of interprofessional communication.^{1,10} Students were exposed to alternative methods of interprofessional communication using various technologies.

Students reported in written reflection papers that this expanded their perception of the importance of this type of communication among interprofessional teams. In addition, participation in the interprofessional simulations positively affected their attitudes toward health care teams.

Systematic reviews document that health professionals use alternative methods of communication including telephones, smartphones, pagers, electronic messaging in the EHR, and task-management systems.⁷⁻⁹ However, none of the reviews focus on the pharmacy profession and their pattern of communication with a health care team. In addition, none of the existing evidence or models include interprofessional students. This study demonstrated the feasibility of integrating alternative methods of communication into IPE.

Challenges exist in organizing IPE activities, such as timing and facilitation.¹⁵ The instructional design of these simulations were beneficial in overcoming common logistical barriers to IPE. None of the simulations required students to be in the same location, which eliminated the need to find additional classroom space and extraneous travel by students. The limited faculty facilitation requirements for these simulations also allowed for easier commitment from other health professions. Regardless of proximity to a medical campus, the approach in these simulations can be used by other institutions to implement IPE.

This study has additional merit beyond contributing to the IPE literature regarding alternative communication. A psychometrically validated survey was used to determine a change in student attitudes toward health care teams.¹² A large sample size of students completed the survey with a good response rate (81%), which was representative of the entire class. In addition, the mixed-methods assessment allowed for measurement of the educational impact beyond attitudes. Student performance was assessed using rubrics and qualitative comments that provided important information regarding achievement of the learning objectives and the IPEC competency. These results demonstrate that alternative methods of communication can be used in IPE while still having a positive impact on students and meeting educational accreditation standards.

While there are many strengths of this study, it is not without limitations. Student attitudes toward health care teams did significantly change for certain survey items. However, the educational significance of those findings may be debated. For example, moving from a median score of a 4 to 5 on the Likert scale was a positive improvement, but didn't necessarily represent a meaningful impact for the students. Our study demonstrated that students already had positive attitudes (based on presurvey

median responses of 4 or 5); therefore, a large increase in attitudes was not possible. In addition, the changes in students' attitudes may not have been solely influenced by the simulation. While no major IPE events occurred outside of this course, other influences such as professional maturation over the semester and outside work experiences may have played a role. While student performance (related to communication or interprofessional care plans) was assessed, rubrics used were not validated. In addition, student behavior related to interprofessional teamwork was not assessed.

Many limitations occurred as a result of the heterogeneity of the interprofessional simulations. In all of the simulations, there were more pharmacy students than the other professions because of an unequal distribution of students (eg, 170 pharmacy students per class compared to 40 occupational therapy students per class). The instructional design varied among the three simulations. For example, only two of the simulations had a formal debriefing session, one simulation required significantly more time to complete, and all the simulations used a different mix of other professions' students. This heterogeneity was necessary to conduct simulations with larger groups of students and to incorporate enough IPE simulations into the required course so all pharmacy students could participate. In addition, the technology used for the Online TOC simulation proved to be a challenge and distracted students from the overall goal of interprofessional collaboration and communication, as evidenced by select student comments in the satisfaction survey results. Faculty time and resources should also be carefully considered. In our experience, creating simulations and IPE activities tend to be more time-intensive than traditional didactic lectures. All of these limitations are being addressed for future iterations of the simulations and course requirements.

The interprofessional simulations continue to be offered in the school of pharmacy. Overall, despite the limitations, the interprofessional simulations have been successful based on improvement in students' interprofessional attitudes and positive reflection comments. Refinements for each simulation are underway, and the ultimate goal for the future is for each pharmacy student to participate in all three simulations as part of the required curriculum. The Online TOC simulation has been moved out of the Clinical Assessment course and into the Pharmacotherapy course sequence. Thus, all pharmacy students will be exposed to this simulation. The MTM Community Pharmacy and Telephone SBAR simulations will continue to be offered in the Clinical Assessment course. The simulations will be offered over two weeks to increase exposure of students to other professions and

work toward decreasing the number of pharmacy students on the interprofessional team; the goal ratio would include only one or two pharmacy students on each interprofessional team. Other schools of pharmacy could consider implementing interprofessional simulations using alternative methods of communication and technology to fulfill ACPE standards and overcome a common barrier of being located physically in different locations.

SUMMARY

Incorporating interprofessional simulations using alternative methods of communication within a required course positively affected pharmacy students' attitudes toward health care teams, perception of communication technologies to enhance collaboration, and performance regarding interprofessional communication/development of interprofessional care plans. Use of technology to enhance interprofessional communication was a successful interprofessional educational model and proved to be effective in eliminating common barriers associated with IPE. Other schools could consider implementing similar simulations to fulfill pharmacy accreditation standards and national interprofessional competencies.

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