INSTRUCTIONAL DESIGN AND ASSESSMENT

Changes in Student Performance and Confidence with a Standardized Patient and Standardized Colleague Interprofessional Activity

Marie L. Davies, PharmD, MS,^{a,b,c} Kristine S. Schonder, PharmD,^{a,b} Susan M. Meyer, PhD,^a Deanne L. Hall, PharmD^{a,b}

^a University of Pittsburgh School of Pharmacy, Pittsburgh, Pennsylvania

^b University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania

^c Western University of Health Sciences College of Pharmacy, Pomona, California

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Objective. To assess the impact of a standardized patient and standardized colleague interprofessional activity on student performance and perceived confidence in communicating with patients and physicians.

Methods. Students in the third professional year were presented with a practice and final activity including a standardized patient interaction, SOAP note preparation, and standardized colleague interaction. Student performance was measured by assessment rubrics on practice and final activities. Students' perceived confidence was measured via presurvey and postsurvey.

Results. Students performed significantly better from the practice to the final activity with regard to communicating with patients, SOAP note, and the overall activity with a mean difference (95% CI) of 9.2 (6.9-11.5), 3.6 (1.3-5.8), and 3.9 (2.0-5.7), respectively. There was a positive significant change from presurvey to postsurvey in students' confidence talking to patients and physicians on majority of questions.

Conclusion. This study demonstrates that active learning and integrated assessments improve overall student performance. Integration of interprofessional education also has positive effects on students' perceived confidence.

Keywords: standardized patient, standardized colleague, integrated assessment, interprofessional education

INTRODUCTION

Active learning and innovative educational models are encouraged in the pharmacy curriculum. Interactive teaching, problem-based learning, and role-playing activities more accurately reflect what students will face when they graduate and go into practice. The use of the standardized patient (SP), a professionally trained actor, presenting as a patient with a history and/or having physical symptoms is successful in health care professional training by simulating "real-life" scenarios.¹ Medical schools have used SPs for decades, and their use in pharmacy is also well established.²⁻⁶ The Association of American Medical Colleges performed a survey among member medical schools on simulation activities and found that more than 40% of their member medical schools train pharmacy professionals via simulation.⁷ Additionally, the use of a SP has been adopted by nursing and dentistry.^{8,9}

In addition to SPs, simulation experiences have been described utilizing standardized colleagues and role play. The standardized colleague is a physician or similar health care professional who portrays a professional role, attitude, and communication style in an interprofessional teaching situation.¹⁰ The advantage of using a standardized colleague is that it is impossible to train a SP or peer student learner to think like a physician with health care, diagnostic, and evidence-based clinical training. However, SPs and standardized colleagues can be difficult to use in curricula because of their cost and other resource requirements. Role play is a more cost-effective strategy that uses students or faculty members to portray the patient or physician colleague. However, studies have shown that students perceive SPs to be more effective in their training than role play.^{11,12}

The American Association of Colleges of Pharmacy (AACP) Center for the Advancement of Pharmacy Education (CAPE) released the fourth edition of its educational outcomes in 2013.¹³ The CAPE outcomes outline knowledge, skills, and attitudes doctor of pharmacy (PharmD) graduates should possess, organized into

Corresponding Author: Marie Davies, PharmD, MS, Western University of Health Sciences, 309 E. Second Street, Pomona, CA 91766-1854. Tel: 909-469-8456. Fax: 909-469-5539. E-mail: mdavies@westernu.edu

4 areas: foundational knowledge, essentials for practice and care, approach to practice and care, and personal and professional development. The 2013 update expanded on expectations within the affective domain, placing importance on professionalism, self-awareness, innovation, and leadership. The idea of integrated assessments across the 4 areas is emphasized to ensure pharmacy students are retaining and applying knowledge, skills, and attitudes. In addition, in 2011, the Accreditation Council for Pharmacy Education (ACPE) updated their Accreditation Standards and Guidelines for the Professional Program in Pharmacy.¹⁴ In this update, ACPE recognized the use of simulation by means of high fidelity manikins, medium fidelity manikins, SPs, standardized colleagues, role play, and computer-based simulations for introductory pharmacy practice experience. The council further suggests that schools of pharmacy should develop interprofessional simulation experiences. The 2016 ACPE Standards includes language related to interprofessional education and preparation for interprofessional collaborative practice across 8 of the 25 Standards (3, 11, 12, 13, 19, 21, 24, and 25) showing its importance in the PharmD curriculum.¹⁵

With the CAPE Outcomes and ACPE Standards in mind, active learning integrated assessments that incorporate interprofessional education in the pharmacy curriculum are ideal. Using SPs and standardized colleagues are educational techniques that may have value over more traditional instructional strategies for facilitating student development of affective skills. Simulation in high-risk interprofessional activities in trauma and emergency departments, and intensive care units is used.¹⁶⁻¹⁸ In these simulation experiences, interprofessional education improves safety, gives clarity in roles, and leads to more effective communication.

Studies on the effectiveness of active learning and simulated interprofessional interactions in integrated assessments in the pharmacy curriculum are needed. We hypothesize that simulated real-life scenarios that integrate both patient care and interprofessional activities utilizing SPs and standardized colleagues will improve pharmacy students' performance and confidence in communicating with patients and physicians.

DESIGN

In the third professional year (P3) of the pharmacy curriculum at the University of Pittsburgh School of Pharmacy, students are introduced to a simulated patient care and interprofessional activity that integrates content from courses taken concurrently in the fall semester and again in the spring semester. This clinical-case activity includes 3 parts: a SP interaction, evidence-based SOAP (subjective,

objective, assessment, plan) note preparation, and a standardized colleague interaction. In the first and second professional years, students use SP interactions to learn patient interviewing techniques and provide counseling and recommendations. In 2010, a simulated activity with SPs and standardized colleagues was added to the P3 curriculum in the fall and spring semesters. While the activity builds on the SP skills learned the first 2 years, the introduction of a standardized colleague is new to P3 students. For the purpose of this evaluation, the focus will be on the activity in the fall 2013 semester.

At the beginning of the fall semester, students were presented with objectives, format, and a description of the integrated patient care and interprofessional activity and were told how the assessment activity would take place. The objectives of the activity were to effectively interview a patient, provide education to the patient, appropriately document using a SOAP note, and provide verbal communication of drug therapy recommendations based on clinical evidence-based medicine. The students were given a practice activity mid-way through the semester and the final activity at the end of the semester, which both consisted of 2 sessions on 2 consecutive days. For the practice activity, students and faculty members role played patient and colleague interactions; the same case was presented to each student. The final activity used SPs and standardized colleagues for 5 different cases randomly assigned to students. The overall goal of this activity was to prepare students for clinical practice experiences and professional practice.

The SPs were actors trained at the university's Advanced Clinical Education Center, which is managed by the Office of Medical Education in the School of Medicine. The standardized colleagues were volunteer family medicine physicians. Prior to the simulated activity, the objectives of the activity and clinical cases were presented to the standardized colleagues. Additionally, standardized colleagues received training on their role in the activity, which consisted of a 1-hour session led by one of the course coordinators, who reviewed the entire activity and the cases. The standardized colleagues were provided with standardized responses for student triggers to each of the cases. The responses questioned and challenged students to defend their answers with evidence from the literature.

For the final assessment activity, each student was assigned to 1 of 5 patient cases that included 2 primary disease state problems requiring medication adjustment and 3 controlled drug-related problems. The cases were reviewed by faculty members to assure an even level of difficulty. Students had no knowledge of the cases prior to the activity and were not aware of the number

of drug-related problems in the case. On the first day, students received a patient medication profile 20 minutes before their interview with the SP. Students were allowed to bring references to prepare for the interview and a prepared list of questions and paper to take notes; they were given 20 minutes to conduct the interview. They were not permitted to use any class notes or pretemplated patient care data collection forms during the interview. An assessment rubric was used to evaluate the students' skills in patient interviewing. The rubric assessed verbal communication and patient assessment skills. Following the SP interview, students developed a detailed SOAP note to document their recommendations for all medical problems built on information obtained from the SP and submitted the SOAP note the next day. For the care plan documentation, a separate rubric was used to assess written communication skills and critical thinking. On the second day, students were given 5 minutes to verbally communicate evidence-based recommendations, prioritizing pressing issues to the standardized colleague physician and to defend their assessment and plan to the physician. A third rubric on the physician interview assessed interprofessional verbal communication and use of evidence-based medicine.

Students were evaluated individually with the rubrics and were then given an overall summative grade. The rubrics were used for both the practice and final activity. Students not meeting the minimum competence, set at 80% for the SP and standardized colleague portion and 75% for the SOAP note portion, were required to repeat the activity. The SP rubric addressed communication skills and ability to obtain a patient history. The SOAP note rubric assessed each component of the note for completeness of information and level of competence for the therapeutic plan for each medical problem. The standardized colleague rubric assessed communication skills, use of evidence-based medicine during a therapeutic discussion, and ability to defend a recommendation.

Students provided informed consent to participate in the study. Midway through the semester before the practice activity, students were given a presurvey that asked questions related to comfort level in counseling patients and confidence in discussing and making recommendations with physicians and other health care professionals. Students then completed the practice activity and were assessed with the performance rubric on the SP interaction, SOAP note, standardized colleague interaction and given an overall performance score.

At the end of the semester, students completed the final activity and were similarly assessed. After the final activity, students took a postsurvey that assessed 10 of the same questions from the presurvey to identify changes in

confidence after the activity. Ten additional questions were added to the postsurvey to assess students' opinions of the integrated interprofessional activity and its ability to enhance the didactic coursework, if the portion using evidence-based medicine enhanced communication, and if the activity should be continued in the curriculum.

Investigators were blinded to student-specific information by assigning students random number identifiers before the presurvey. A spreadsheet matching the random numbers to the students' names was kept in a password-protected database controlled by a noninvestigator associated with the school of pharmacy. Students were provided the same unique random number for the presurvey and postsurvey. The noninvestigator linked the random numbers to the students' performance assessments for final evaluation of the data.

The primary objective of this study was to measure the change in students' performance overall, as well as individual SP, SOAP, and standardized colleague components, from the practice to the final integrated assessment. Secondary objectives included determining the change in students' confidence talking to patients and providers before and after the integrated assessments via a presurvey and postsurvey, if students felt the integrated interprofessional activity was beneficial to the pharmacy curriculum, and if students' confidence level correlated with their performance.

All enrolled third-year students were included in this study. Students were excluded from analysis if they had missing data (ie, did not complete one or both surveys) or were excluded from the correlation objective if they did not have a random number to link their change in performance to their change in perceived confidence identified via the surveys. The project was determined by the University of Pittsburgh Institutional Review Board (IRB) to be exempt from review because it focused on an educational strategy already implemented into the curriculum and data were de-identified.

To objectively determine if the student learning was enhanced, performance on the practice activity was compared to the final activity with a student's *t* test for the overall assessment score and for each individual component (SP, SOAP, and standardized colleague).¹⁹ Each performance rubric assessment was weighted differently in terms of points. Each individual part was calculated on a 1-100% scale. The presurvey and postsurvey used a 5-point Likert scale (1=strongly disagree to 5=strongly agree), and the degree of change between the surveys' median scores on the Likert scale was assessed via a Mann-Whitney U test.²⁰ Descriptive statistics were used to assess the questions about students' attitudes and perceptions of the interprofessional activity from

the postsurvey. To evaluate if students' confidence correlated with performance, the final standardized colleague performance assessment was matched to the postsurvey question "I feel comfortable speaking with physicians." Because the postsurvey had a score of 1-5 and the performance assessment was 1-100, the performance assessment scores were divided into quintiles 1-5 based on the distribution of student scores to have equal intervals. The lowest scores were assigned to quintile 1 and highest scores were assigned to quintile 5.

EVALUATION AND ASSESSMENT

One hundred nine P3 pharmacy students completed both the practice and final activities and were included in the study. Of these, 107 completed the presurvey and the postsurvey. Fifteen students did not provide random numbers for either survey and were excluded from the analysis that correlated survey data. Prior to the practice activity, 75 (70%) students had experience communicating with physicians, but only 43 (40%) had communicated in person with physicians, and only 28 (26%) had provided a recommendation.

Students performed significantly better from the practice activity to the final activity communicating with patients, as evidenced by the SP interaction, with a mean difference of 9.2 (95% CI: 6.7-11.5, $p<0.0001$), the SOAP note with a difference of 3.6 (95% CI: 1.3-5.8, $p=0.002$), and on the overall activity with a difference of 3.9 (95% CI: 2.0-5.7, $p<0.0001$). There was no difference in student performance with regard to the standardized colleague interaction (Table 1). Questions that assessed student confidence talking to patients and providers from both surveys can be found in Table 2. All 10 questions were normally distributed and the computed Z-score was used to assess significance. Seven of the 10 questions reached significance, indicating a positive change in student perception of comfort and confidence talking to patients and physicians and the role of education on interprofessional relationships. One negatively worded question (#6) reached significance showing students felt more anxious talking to physicians. Questions 1 and 3 were not statistically different from presurvey to postsurvey.

Table 3 shows student responses to the 10 postsurvey questions on attitudes and perceptions about the SP and standardized colleague interprofessional activity. Overall, on questions that were positively worded (questions 1-2 and 5-10), an average of 83.5% of students agreed or strongly agreed that the activity strengthened their communication skills, perceived it to be helpful to their future success, and recommended continuation of the activity. Questions 3-4 were negatively worded where disagree and strongly disagree would indicate a positive response and on average 82.7% selected one of these choices.

Regarding student performance on the standardized colleague interaction for the final activity correlating with student perceived confidence with physicians, there was a positive slope in the linear regression (Figure 1), but the correlation did not reach significance.

DISCUSSION

Many surveys evaluate student perceptions of and attitudes about the use of SPs in pharmacy curricula.⁴⁻⁶ However, assessment on outcomes of integrating SPs and standardized colleagues into patient communication and interprofessional interaction training, evidence-based medicine, and active learning in the pharmacy curriculum is lacking. Interprofessional relationships are important in all health care settings. Therefore, exposure to such interactions benefits pharmacy students and allows faculty members to assess if student training is optimized by improving communication skills and ability to recommend evidence-based therapies.

Within the pharmacy education, a study by Vyas et al demonstrated the value of an interprofessional class, with students from pharmacy, medicine, nursing, and other health professions. Using 5 different simulated activities, more than 90% of the students agreed that the importance of interprofessional communication was enhanced with simulation. Additionally, students felt more comfortable disclosing an error to the patient's physician after the simulation activity.²¹ Furthermore, research on the use of standardized colleagues in nursing education resulted in positive changes in students' attitudes regarding interprofessional communications.¹⁰ These positive perceptions show the educational value of developing interprofessional

Table 1. Student Performance (max 100) with SP and Standardized Colleague Interprofessional Activity (n=109)

	SP	SOAP	Standardized Colleague	Overall
Practice activity average (SD)	82.0 (10.8)	85.3 (10.6)	88.4 (10.5)	85.2 (8.1)
Final activity average (SD)	91.2 (6.1)	88.8 (5.4)	87.6 (11.5)	89.1 (5.4)
Diff (95% CI)	9.2 (6.9-11.5)	3.6 (1.3-5.8)	-.083 (-3.8-2.1)	3.9(2.01-5.7)
<i>p</i> value	<0.0001	0.002	0.58	<0.0001

SP = standardized patient; SOAP = subjective, objective, assessment, plan note

Table 2. Changes in Perceived Confidence with the SP and Standardized Colleague Interprofessional Activity (n=107)

	Presurvey Median	Postsurvey Median	Z-Score	p value
I feel the information provided in the pharmacy curriculum has increased my confidence in speaking with patients.	4	5	1.30	0.20
Education on interprofessional relationships between physicians and pharmacists should be included in the PharmD curriculum.	4	5	2.61	0.009
Physicians and pharmacists should be educated to establish collaborative relationships.	5	5	1.33	0.18
I like to collaborate with other health care professionals.	4	5	2.50	0.012
I feel confident making recommendations to physicians regarding patient care.	3	4	5.88	<0.0001
Talking to physicians makes me feel anxious.	3	4	-5.15	<0.0001
I am comfortable in initiating potentially difficult communication topics with physicians.	2	3	5.23	<0.0001
I feel comfortable speaking with physicians.	3	4	3.09	0.002
I feel comfortable speaking with nursing or other medical staff.	4	4	2.29	0.023
I feel comfortable speaking with patients.	4	5	2.55	0.011

SP = standardized patient

relationships to enhance patient care and to prepare students for communicating with physicians. Our study similarly resulted in significant positive changes in students' perceived confidence talking to patients and physicians and the role of interprofessional education.

Students in our study perceived interprofessional interactions as important in the curriculum ("Education on interprofessional relationships between physicians and pharmacists should be included in the PharmD curriculum"; $p=0.009$). Additionally, from the changes observed

Table 3. Attitudes and Perceptions about the SP and Standardized Colleague Interprofessional Activity (n=107)

	Median	Agree/ Strongly Agree Responses, n (%)
I think this activity increased my confidence level in communication skills with patients.	4	96 (89.7)
I think this activity increased my confidence level in communication skills with physicians.	4	85 (79.4)
This activity did not help prepare me to counsel patients.	2	86 (80.4)*
This activity did not help prepare me to make recommendations to physicians.	2	91 (85)*
I enjoyed the opportunity to try out the communication techniques we learn in the didactic pharmacy curriculum.	4	81 (75.7)
This activity enhanced the lectures in the didactic pharmacy curriculum.	4	88 (82.2)
I feel the standardized colleague interaction helped prepare me for potential encounters where a physician questions or disagrees with my recommendation.	4	85 (79.4)
Utilizing evidence-based medicine and SOAP note writing added to my ability to communicate with the standardized colleague.	4	95 (88.8)
I feel this activity will help me to be a better pharmacist.	4	93 (86.9)
I would recommend the continued use of this activity to enhance student communication.	5	92 (86)

*Disagree and strongly disagree responses reported

SP = standardized patient; SOAP = subjective, objective, assessment, plan note

Figure 1. Correlation between students' confidence level and standardized colleague performance (n=92).

in presurvey and postsurvey, the greatest increase was in student confidence making evidence-based recommendations and defending these recommendations even if a physician disagreed.

When looking at outcomes of a curricular design, it can be difficult to obtain objective data as most of the curriculum is standard for all students. One example of objective data was from Safdieh et al's medical school study where the class was split into two cohorts, one that experienced the standard curriculum and one that participated in an additional SP session focusing on the neurologic examination of a patient.²² The intervention group had significant improvements in objective structured clinical examination (OSCE) neurologic examination scores ($p < 0.0001$). Similarly, our study tried to identify objective outcomes. The practice and final activity resulted in positive performance changes in the SP, SOAP note, and overall activity, evidenced by improvements in the rubric assessments ($p < 0.0001$, $p = 0.002$, and $p < 0.0001$, respectively). Unfortunately, our study results did not support the objective of performance improvement with the standardized colleague or interprofessional piece. However, Shrader et al's study identified that interprofessional teamwork of medicine, pharmacy, and physician assistant students resulted in positive clinical outcomes based on a developed checklist of clinical tasks.²³ Therefore, the standardized colleague or interprofessional education piece should be continually followed throughout the curriculum to see if student performance and confidence is further enhanced through more interprofessional interactions.

Another way to objectively assess a curricular design is to correlate subjective perceptions to objective data. Naughton and Friesner attempted to correlate students' perceptions of competency to actual performance on the

Pharmacy Curricular Outcomes Assessment but did not identify a significant correlation, showing attitudes may not accurately reflect clinical objective performance.²⁴ Likewise, our study did not show a correlation when we assessed standardized colleague performance to perceived confidence in communicating with physicians. This could be attributed to a lack of power as the relationship revealed a positive slope without reaching significance.

There are several important limitations to our study. There was no control group to assess if the activity changed students' objective scores on a given assessment. Additionally, those grading the performance rubrics were not the same for all 109 students for the practice and the final activity, which may have affected inter-rater reliability. However, training was provided to all those involved in the activity and the rubrics were clearly defined to limit this bias. In the practice session, the interprofessional activity was role play, as pharmacy residents portrayed the physicians, while the final integrated assessment used standardized colleagues. This could account for the lack of difference in student performance on the standardized colleague portion, as students may have been more relaxed and confident during the practice activity. Furthermore, the cases used for this final activity were new integrated cases that had not been used in prior years. Based on student performance, course coordinators realized that 1 of the 5 integrated cases from the final activity was more difficult than the others, which may have slightly skewed results. The survey was not validated with a test group; instead, questions from previous studies were used to recreate similar survey questions.¹⁰⁻¹⁸ Regarding additional postsurvey questions, although most students chose agree and strongly agree, 20% on average were neutral or did not agree. It is difficult to know, therefore, if this was survey fatigue or if students had a bad experience with the activity. Future surveys may include the use of a comments section to further investigate this matter.

To our knowledge, our study is the first to report results of a simulated activity using both SPs and standardized colleagues in an integrated assessment in the PharmD curriculum. This integrated activity challenged students to draw from their therapeutic knowledge, search for evidence-based medicine to defend their answer, and communicate with patients and physicians. That the standardized colleague performance did not improve from the practice to the final activity suggests that students may have viewed the role play in the practice activity as too relaxed or that the grading may have been more lenient in the practice activity for the standardized colleague piece. The activity was also done in the spring with standardized colleague physicians so further assessment on the use of

standardized colleagues would be beneficial. However, students' perceptions were that they felt more confident and comfortable communicating, dealing with difficult situations, and defending recommendations to physicians. Using the additional spring activity and future years' data to increase power, we will be able to further assess a correlation between perceptions of performance and actual performance on the standardized colleague piece. This will allow us to defend, beyond students' perceptions alone, if the interprofessional piece is truly beneficial and a good use of resources.

Through the rubric and survey assessments, we identified positive changes in student performance and positive attitudes, feelings, and perceptions about confidence and communication with patients and physicians. Because of the success of this activity, interprofessional education, integrated assessments, and active learning through the use of SPs and standardized colleagues are being incorporated into the University of Pittsburgh curriculum.

SUMMARY

By emphasizing interprofessional interactions, active learning, and communication, students' overall performance improved significantly, specifically on the SP interaction and SOAP note. Additionally, students' comfort communicating with physicians and defending recommendations improved.

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