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Building Interprofessional Competencies Through a Collaborative Prescribing Activity With Osteopathic, Pharmacy, and Physician Assistant Students

Veronica Vernon, PharmD[†], Brian W. Skinner, PharmD[*,†], Patricia S. Devine, PharmD, Lori Fauquher, MS, PA-C, Emily Young, MD

*Corresponding author: bskinner@marian.edu

[†]Co-primary authors

Abstract

Introduction: Medication errors can lead to significant adverse events. Nearly 50% of medication errors occur during the prescription-writing stage of the medication use process, and effective interprofessional collaboration and communication are key to reducing error in this process. **Methods:** We developed a three-part, 60-minute, interprofessional education activity providing medical, physician assistant, and pharmacy students the opportunity to practice collegial interprofessional communication surrounding prescribing practices. Learners met virtually initially as a large group and divided into small groups facilitated by a health professional. Part 1 involved reviewing two prescriptions prepared by learners; part 2 was a discussion about the education, roles, and responsibilities of each profession; and part 3 focused on identifying prescription errors in examples provided by faculty. Students completed a post-pre survey measuring their perception of learning the Interprofessional Collaborative Competency Attainment Survey (ICCAS) areas. **Results:** Of 317 participants (151 doctor of osteopathy, 68 master of physician assistant studies, and 98 doctor of pharmacy students), 286 completed the post-pre survey, for a 90% response rate. Students reported statistically significant ($p < .001$) increases in all 20 questions spanning the six ICCAS areas. **Discussion:** The virtual format allowed multiple institutions to participate from various locations. It broadened the learners' experience by fostering interaction among those with varied perspectives and allowed collaboration between locations and programs that otherwise could not have participated. The activity introduced students to virtual collaboration and key telehealth skills, enhancing their confidence and familiarity with virtual interactions in a professional setting.

Keywords

Prescription Writing, Case-Based Learning, Communication Skills, Interdisciplinary Medicine, Online/Distance Learning, Practice Management, Interprofessional Education

Educational Objectives

By the end of this activity, learners will be able to:

1. Respectfully exchange critiques of written prescriptions to identify errors.
2. Collaborate on prescription-writing best practices to improve communication, ensure clear and accurate transmission of medication information between health care professionals, and minimize the risk of errors.
3. Analyze the unique challenges and responsibilities associated with prescription writing in the context of interprofessional collaborative teams.
4. Recognize the value of working across disciplines for patient-centered care.
5. Discuss the different training backgrounds, roles, and challenges experienced by pharmacy, physician assistant, and osteopathic professionals.

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Introduction

Medication errors can lead to significant adverse events, including death. The annual global cost of treating them is an estimated $42 billion.[1] Nearly 50% of medication errors occur during the prescription-writing stage of the medication use process, such as selecting the wrong medication, route, dose,

or frequency.[2,3] The third World Health Organization (WHO) Global Patient Safety Challenge is "medication without harm," which focuses on reducing medication-related harm by 50% over 5 years. The strategic framework for the Global Patient Safety Challenge was created to reduce medication errors, including those at the prescribing stage. Two domains of this framework related to health care professionals are "education and training" and "collaboration and teamwork."[1]

Interprofessional education (IPE), as defined by the WHO, occurs when multiple professions learn about, from, and with each other in order to improve collaboration and health outcomes.[4] A variety of rich IPE experiences are described in the literature. We reviewed *MedEdPORTAL* for publications that fit our criteria for an IPE-related prescription-writing activity. A non-IPE prescription-writing activity was available,[5] along with IPE activities encompassing other aspects of patient care,[6,7] but none fit our specific needs. We found two additional articles outside *MedEdPORTAL* that involved pharmacy and medical students in prescription-writing exercises. The first article involved a workshop during which final-year pharmacy students taught second-year medical students how to write prescriptions.[8] The second article described collaboration between first-year medical students and third-year pharmacy students on pharmacogenomics patient cases, and a portion of this activity provided an opportunity for pharmacy students to give feedback on written prescriptions.[9]

As a result, we sought to create an IPE activity for osteopathic medicine (DO), physician assistant (PA), and pharmacy students. All three disciplines have standards related to IPE.[10-14] Pharmacy schools must include interprofessional learning opportunities for students and are assessed on this as part of their accreditation.[13] Additionally, a common thread in the curricula of the three programs is prescribing and interpreting prescriptions. "Enter and discuss orders and prescriptions" is an entrustable professional activity (EPA) for entering residency for medical students.[15] "Therapeutic management and planning" is a required graduation competency for PA students according to the PA Education Association,[16] and "fulfill a medication order" is an EPA for pharmacy students upon graduation.[17] Thus, an IPE activity centered on writing prescriptions would be beneficial to each profession. Our activity provides students with an experience that spans the four Interprofessional Education Collaborative (IPEC) competency domains: Interprofessional Teamwork and Team-Based Practice, Interprofessional Communication Practices, Roles and Responsibilities for Collaborative Practice, and Values/Ethics for Interprofessional Practice.[18]

Our activity allows all three disciplines to teach and learn interprofessional competencies through a written prescription activity. We developed a three-part, 60-minute, interdisciplinary activity that provides DO students and PA students the opportunity to receive from peers enrolled in pharmacy school real-time feedback regarding their ability to write a prescription that is accurate and clear and meets state legal requirements. Simulated practice of prescribing has been shown to increase confidence and collaboration when other health care professions are represented in the activity.[8,19] As the PA students are in the final semester of their training, this also allows them to share what they have learned from their clinical rotations with medical and pharmacy students still in the didactic portion of their own curricula. Additionally, this activity provides an opportunity for different health profession students to discuss their respective education and training, their role in the health care team, and challenges unique to their future profession. We piloted the program in the spring of 2022 with the three programs and modified it in spring 2023 for use with 317 students (151 DO, 68 PA, and 98 pharmacy students). Prior to implementation, each institution taught information related to prescription writing relevant to their specific discipline, the timelines of which varied based on curricular design (Appendix A).

Methods

This activity consisted of three parts: Part 1 involved writing two prescriptions; part 2 was a group discussion on education, roles, and responsibilities of DOs, PAs, and pharmacists; and part 3 focused on error recognition in written prescriptions. The students were divided into three large groups, scheduled sequentially within the same afternoon, to accommodate the number of facilitators available. There was a 15-minute break to allow for turnover between each session. The large groups were then divided into 17-18 smaller cohorts, with trainees from each profession in each. In parts 1 and 2, each cohort was led by a pharmacist, PA, or physician who facilitated discussion and ensured coverage of the learning objectives. Faculty were recruited to facilitate based on their interest in IPE. To expose students to facilitators from all three professions, we returned to a large-group activity for part 3, after the small-group breakout sessions. This was more feasible than providing facilitators from each profession for all cohorts. We hosted the activity virtually using a videoconferencing system due to space constraints and geographic distance between the two universities involved.

Students from each profession needed to have an entry-level understanding of the legal requirements of prescription writing,

knowledge of commonly used abbreviations, and the ability to calculate patient-specific dosages when using a drug reference. DO students had received a self-paced prescription-writing module in a previous semester. PA students had coursework embedded in clinical medicine courses during their didactic year as well as training in prescription writing in their health care communications course. They also practiced application of prescription writing during clinical rotations throughout the second year of the curriculum. Pharmacy students learned legal requirements, formatting, and common issues regarding prescription writing in the first professional year of their curriculum and applied this content throughout the curriculum in labs, courses, and rotations. Additionally, all learners had prior IPE collaboration events within their respective curricula. The pharmacy students had completed a longitudinal four-semester IPE course series that contained IPE content and experiences. PA and DO students had participated in multiple IPE experiences spanning the didactic and clinical years at their respective programs. We utilized third-year pharmacy and second-year DO students in their last semester of didactic education before entering clinical rotations, along with PA students currently completing clinical rotations in their last semester before graduation.

Instructions to Learners

Learners received an overview of the activity that included learning objectives along with the required preclass assignment (Appendix B) and their assigned groups (Appendix C). We reminded students about the event and provided a link to the video-conferencing service for their respective sessions. We instructed them to come in professional dress, to have their camera on and microphone muted but available, and to change their display name to include their name and future credentials (i.e., PharmD, DO, or PA). Students had a copy of their completed preclass assignment on their devices and were prepared to share their screen during the small-group sessions.

Administrative Support

One faculty member and staff from each program provided a roster of students and facilitators from each program; a staff member sorted the students into groups of five to seven, ensuring each group had all three types of learners. The hosting institution was responsible for creating a videoconferencing link for each large-group session to be shared with all students and facilitators. One faculty member during each session created the breakout rooms, assigned participants to their respective rooms, took attendance, monitored the session in case a participant unintentionally was disconnected and needed assistance to rejoin, and called the participants back to the main room at the appropriate time (Table 1).

Lead Faculty and Facilitators

Each program assigned a lead faculty member to ensure all content was posted to their online learning management system in advance of the event and to answer student questions.

As students entered the videoconference, instructions were displayed, reminding students of the expectations regarding camera and microphone usage, as well as expectations regarding their display name (Appendix D). The lead faculty provided a brief overview of the day's schedule and each group member's expectations (Appendix D).

Facilitators received a copy of the facilitator guide (Appendix E) and reviewed all materials before the session.

During part 1, facilitators asked student volunteers from either the PA or DO program to share their prescriptions with the group and solicit feedback. Pharmacy students provided feedback first on each shared prescription, followed by the other students. If an error or discrepancy was noted on the prescription, students were encouraged to help identify the proper changes as well as to explain how to calculate a patient-specific dose using reference material. Multiple students shared their prescriptions as time allowed. Facilitators were responsible for ensuring each student had an opportunity to receive direct feedback and for maintaining the time between activities.

During part 2 of the exercise, facilitators encouraged students from each profession to briefly describe their education and training, their role in the health care team, and the challenges they expected to face in their professions. The questions were meant to be a starting point for discussion, not an exclusive list. The focus of part 2 was on students sharing their experiences and expectations as they entered their profession.

Once all participants had returned to the main room, the lead faculty began part 3 by providing a series of prescriptions with several errors and asking students to identify what concerns

Table 1. Facilitation Timeline

Activity	Suggested Time	Location
Welcome and introduction	5 minutes	Main room
Part 1: prescription writing	15 minutes	Breakout rooms
Part 2: roles of the profession	15 minutes	Breakout rooms
Part 3: prescription errors	15 minutes	Main room
Debrief	9 minutes	Main room
Survey distribution	1 minute	Main room

or issues they saw (Appendix D, cases 3-5). The lead faculty encouraged students from each profession to participate in the discussion. Time was reserved at the end of the activity for a debrief about what each group of students had learned about the other professions with which they had interacted. We shared the link to the post-pre survey at the end of the activity via the chat function and email after the event and encouraged students to complete the survey before exiting the videoconferencing meeting (Appendix F).

Survey Development

A post-pre survey assesses students' perception of change after an educational activity or intervention. A perception of change survey can assess knowledge and skills, personal attributes, or their impact on future behavior. Although similar to a pre-post survey, a post-pre survey design has several advantages both in administration and in elimination of knowledge bias. Unlike a pre-post survey that has to be administered both before and after an educational event, a post-pre survey is administered once at the conclusion of the event. With a pre-post survey design, students may unintentionally rate their level of knowledge higher due to a lack of awareness of opportunity for growth in an area. A post-pre assessment allows students to utilize their current level of knowledge as a benchmark for their initial level of knowledge prior to the intervention.[20] Our post-pre survey was developed based on the validated Interprofessional Collaborative Competency Attainment Survey (ICCAS) and had been utilized for other IPE activities.[21,22] Across 20 items using a 7-point Likert scale (1 = *strongly disagree,* 7 = *strongly agree*), the ICCAS measures six competencies similar to the competencies developed by the IPEC (Figure). Additionally, four open-ended questions were included to provide formative feedback for improvement (Appendix F).

The mean and standard deviation were calculated and reported for each Likert-scale question. Inferential statistics were determined with IBM's SPSS (version 29). The Wilcoxon signed rank test for nonparametric data was used to evaluate the paired responses to the post-pre survey Likert-scale responses, with an alpha set at .05. This project was determined to be exempt by institutional review boards at both institutions. Additionally, learners had an opportunity to provide open-ended feedback regarding the event to drive future improvements.

Results

Together, faculty from three professions at two universities developed an IPE prescription-writing virtual event that was piloted in January 2022 and implemented as a required component in each profession's curriculum in February 2023. In total, 317 students participated in the 2023 activity: 151 DO second-year students, 68 PA master's second-years, and 98 doctor of pharmacy third-year students. Of the 317 participants, 286 completed the post-pre survey measuring their perception of learning the ICCAS areas, for an overall response rate of 90%. Students reported statistically significant increases ($p < .001$) in all 20 items across six ICCAS areas (team functioning,

IPEC Competency Domains	ICCAS Competency Areas
Interprofessional Teamwork and Team-Based Practice	Team Functioning
	Collaboration
Interprofessional Communication Practices	Communication
Roles and Responsibilities for Collaborative Practice	Roles and Responsibilities
	Collaborative Patient/Family-Centered Approach
Values/Ethics for Interprofessional Practice	Conflict Management/Resolution

Figure. Comparison of IPEC competency domains and ICCAS competency areas. Abbreviations: IPEC, Interprofessional Education Collaborative; ICCAS, Interprofessional Collaborative Competency Attainment Survey.

communication, collaboration, roles and responsibilities, collaborative patient/family-centered approach, and conflict management; Table 2).

While not designed as a formal qualitative analysis, responses to the open-ended questions were reviewed. Responses to "What do you see as the value of interprofessional collaboration?" included comments about improving patient outcomes and patient safety, enhancing one's own comfort level when working with other professions, and learning about others' perspectives in prescribing medications. Common responses to the question "What did you learn about, with and/or from the other professions in your group?" were how to work as a team, others' perspectives, and different roles in health care. When asked how this event could be improved, many commented positively on the event structure, content, and/or facilitators, including "Favorite IPE event so far!" Suggestions for improvement were (1) centering the activity around a patient case that included writing prescriptions for the patient, (2) providing more time for discussion, and (3) offering more IPE events similar to this one.

Seventeen faculty from all three professions participated as small-group facilitators. Faculty were not formally surveyed; however, during the postevent informal quality assurance discussion, most facilitators felt their groups had been very engaged, asked insightful questions of each other, and appreciated each other's contributions.

Discussion

With limitations on in-person activities predominating in the educational environment during the COVID-19 pandemic, planning interactive IPE events became very challenging. The implementation of this activity in the setting of these restrictions allowed students to interact with the benefit of virtual learning and continue to work toward their program goals in IPE. Having transitioned to the virtual platform initially out of necessity, we noted that this mode of learning could offer additional advantages to an event of this kind. Constraints such as limited health profession programs in the same geographic area, space limitations, and insufficient numbers of faculty facilitators often create barriers to in-person events of this size. Our activity allows for either an in-person event or an easy transition to a virtual event that can be used across many disciplines and across state lines, opening up more opportunities for learners in various health care specialties to participate. The virtual format also requires fewer faculty facilitators to effectively manage a large

Table 2. Students' Self-Assessment Responses to the Prompt "Please Rate Your Ability for Each of the Following Statements Prior to and After Today's Event" ($N = 286$)

Statement[a]	Preperception *M* (*SD*)	Postperception *M* (*SD*)	*p*
Communication			
Promote effective communication among members	5.3 (1.2)	6.1 (0.9)	<.001
Actively listen to interprofessional professional team members' ideas and concerns	6.0 (1.1)	6.4 (0.8)	<.001
Express my ideas and concerns without being judgmental	5.9 (1.2)	6.3 (0.9)	<.001
Provide constructive feedback to interprofessional team members	5.5 (1.3)	6.1 (1.0)	<.001
Express my ideas and concerns in a clear, concise manner	5.7 (1.2)	6.1 (0.9)	<.001
Collaboration			
Seek out interprofessional team members to address issues	5.5 (1.2)	6.1 (1.1)	<.001
Work effectively with interprofessional team members to enhance care	5.8 (1.1)	6.3 (0.9)	<.001
Learn with, from, and about interprofessional team members to enhance care	5.7 (1.2)	6.3 (0.9)	<.001
Roles and responsibilities			
Identify and describe my abilities and contributions to the interprofessional team	5.6 (1.3)	6.1 (1.2)	<.001
Be accountable for my contributions to the interprofessional team	5.8 (1.2)	6.2 (1.0)	<.001
Understand the abilities and contributions of interprofessional team members	5.6 (1.2)	6.3 (1.0)	<.001
Recognize how others' skills and knowledge complement and overlap with my own	5.7 (1.2)	6.3 (0.9)	<.001
Collaborative patient/family-centered approach			
Use an interprofessional team approach with the patient to assess the health situation	5.5 (1.3)	6.1 (1.2)	<.001
Use an interprofessional team approach with the patient to provide whole person care	5.6 (1.3)	6.1 (1.3)	<.001
Include the patient/family in decision-making	5.4 (1.6)	5.8 (1.6)	<.001
Conflict management/resolution			
Actively listen to the perspectives of interprofessional team members	5.9 (1.2)	6.3 (1.0)	<.001
Take into account the ideas of interprofessional team members	6.0 (1.1)	6.4 (0.9)	<.001
Address team conflict in a respectful manner	5.9 (1.4)	6.2 (1.4)	<.001
Team functioning			
Develop an effective care plan with interprofessional team members	5.7 (1.3)	6.2 (1.2)	<.001
Negotiate responsibilities within overlapping scopes of practice	5.6 (1.4)	6.0 (1.2)	<.001

[a]From the Interprofessional Collaborative Competency Attainment Survey; rated on a 7-point Likert scale (1 = *strongly disagree,* 2 = *moderately disagree,* 3 = *slightly disagree,* 4 = *neutral,* 5 = *slightly agree,* 6 = *moderately agree,* 7 = *strongly agree*).

group of students in breakout rooms than would be necessary for a live event.

Our activity had results similar to other IPE events described in the literature. An IPE activity involving PAs and pharmacy students found an increase in the perception of team member value, efficiency, and accommodation.[23] Durham, Lie, and Lohenry noted an increase in the understanding of the respective roles of team members with medical, pharmacy, and PA students in their IPE activity.[6] The students in our activity demonstrated growth in all areas as measured by the ICCAS.

Many aspects of the activity met the intended objectives. The virtual format allowed multiple institutions to participate, broadening the learners' experience by fostering interaction with others with varied perspectives from other locations and programs. This format supported many student participants when space limitations prevented physically convening a group the same size in one location. The activity also introduced students to virtual collaboration and skills essential to the ever-growing field of telehealth, enhancing their confidence and familiarity with virtual interactions in a professional setting. Moreover, the three-part format provided the flexibility to rearrange the activity or use only part of it, if desired.

In addition, participation from multiple learners with prescribing ability generated more diverse discussions and perspectives on prescription writing. Assigning prework to learners before the interactive event proved to be effective in assuring they were well prepared to contribute to more in-depth and well-rounded discussions during the event. This preparation step also produced more time for discussion during the event. The post-pre survey indicated improvement across all IPE competency areas and an increased appreciation for the various participating professions.

We noted several limitations that could be improved on for future cohorts and further enrich the learning potential of the activity. While virtual learning platforms work well to allow multiple learners from various locations to participate, survey results indicated that some learners felt they would gain more from the in-person interaction of live events. Virtual forums tend to limit bidirectional communication, especially from the breakout groups to the main facilitator. They also necessitate more stringent time constraints that may end breakout room discussions abruptly. Many groups ran out of discussion time in their breakout sessions, a limitation that might improve in a live setting where the event could be longer with more time dedicated to small-group discussions. The virtual design also requires additional facilitator preparation, such as planning breakout session groups, assigning students to those groups during or before the event, and managing the technology of the virtual platform. While a smaller number of facilitators can manage breakout rooms virtually, they are required to move from group to group, jumping in and out of breakout rooms, which can interrupt learners' discussions. Finally, while this activity challenges learners to assess and practice their prescription-writing knowledge and skills, it does not simulate electronic prescription writing, arguably a more applicable method used in clinical practice.

The post-pre survey assessment method is reliable for showing student perceptions of their knowledge level. The response rate was very high, with 90% of students completing the survey following the activity. Requiring students to complete the survey before leaving the event contributes to higher response rates and stronger data. Although the survey provided reliable outcome data on learners' perspectives, it did not adequately reflect their mastery of content related to prescription writing. Future surveys should include a question assessing how the activity affected students' abilities and comfort with prescription writing. Other opportunities for future research include development and execution of a qualitative analysis of learner perspectives on how the activity helps them learn about prescription writing or interprofessional competencies and/or capturing the viewpoint of facilitators. After repeating this learning activity a second year and receiving positive outcomes, all three of our programs plan to continue offering the session moving forward.

This learning activity provides an opportunity to collaborate with multiple health professions across different institutions. It can be used by any pharmacy program in coordination with PA students and osteopathic medical students. Additionally, it can be adapted for other health professions with prescriptive authority, including allopathic medical students and nurse practitioner students. Students can be enrolled at the same or different institutions without restriction on geographical locale when using a videoconferencing system. Survey results demonstrated a statistically significant increase in all 20 questions spanning six interprofessional collaboration competency areas, and students reported generally positive experiences regarding multiple aspects of the activity, including its implementation, the value of collaboration, and the roles of each health profession. If implementing the activity, institutions should ensure adequate educational technology support is available to facilitate its virtual delivery.

Appendices

A. Timeline for Implementation.pptx

B. Prework Instructions.docx

C. Example Groups.xlsx

D. Introductory Slides.pptx

E. Facilitator Guide.docx

F. Post-Pre Survey.docx

All appendices are peer reviewed as integral parts of the Original Publication.

Veronica Vernon, PharmD: Assistant Professor, Department of Pharmacy Practice, Butler University College of Pharmacy and Health Sciences; ORCID: https://orcid.org/0000-0002-5638-3851

Brian W. Skinner, PharmD: Associate Professor of Internal Medicine, Department of Clinical Sciences, Marian University College of Osteopathic Medicine; ORCID: https://orcid.org/0000-0003-3814-7887

Patricia S. Devine, PharmD: Professor, Department of Pharmacy Practice, and Director of Interprofessional Education, Butler University College of Pharmacy and Health Sciences

Lori Fauquher, MS, PA-C: Assistant Professor, Physician Assistant Program, Butler University College of Pharmacy and Health Sciences

Emily Young, MD: Associate Professor of Pediatrics, Department of Clinical Sciences, Marian University College of Osteopathic Medicine

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Ethical Approval

The Butler University Institutional Review Board and the Marian University Institutional Review Board deemed further review of this project not necessary.

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