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Interprofessional education in pharmacology using high-fidelity simulation

Brittney A. Meyer^{a,*}, Teresa M. Seefeldt^a, Surachat Ngorsuraches^a, Lori D. Hendrickx^b, Paula M. Lubeck^c, Debra K. Farver^a, Jodi R. Heins^a^a South Dakota State University, College of Pharmacy and Allied Health Professions, Box 2202C, Brookings, SD 57007, United States^b South Dakota State University College of Nursing, Box 2275, Brookings, SD 57007, United States^c Avera McKennan Hospital & University Health Center, 1325 S Cliff Ave., Sioux Falls, SD 57105, United States

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ABSTRACT

Background: This study examined the feasibility of an interprofessional high-fidelity pharmacology simulation and its impact on pharmacy and nursing students' perceptions of interprofessionalism and pharmacology knowledge.

Interprofessional education activity: Pharmacy and nursing students participated in a pharmacology simulation using a high-fidelity patient simulator. Faculty-facilitated debriefing included discussion of the case and collaboration. To determine the impact of the activity on students' perceptions of interprofessionalism and their ability to apply pharmacology knowledge, surveys were administered to students before and after the simulation. Attitudes Toward Health Care Teams scale (ATHCT) scores improved from 4.55 to 4.72 on a scale of 1–6 ($p = 0.005$). Almost all (over 90%) of the students stated their pharmacology knowledge and their ability to apply that knowledge improved following the simulation.

Discussion: A simulation in pharmacology is feasible and favorably affected students' interprofessionalism and pharmacology knowledge perceptions.

Implications: Pharmacology is a core science course required by multiple health professions in early program curricula, making it favorable for incorporation of interprofessional learning experiences. However, reports of high-fidelity interprofessional simulation in pharmacology courses are limited. This manuscript contributes to the literature in the field of interprofessional education by demonstrating that an interprofessional simulation in pharmacology is feasible and can favorably affect students' perceptions of interprofessionalism. This manuscript provides an example of a pharmacology interprofessional simulation that faculty in other programs can use to build similar educational activities.

Background

Interprofessional education has been defined by the World Health Organization as occurring “when students from two or more professions learn about, from, and with each other to enable effective collaboration and improve health outcomes.”¹ Because of the focus on interprofessional practice in healthcare, interprofessional education has been identified as an essential element in the education of health professions students² and has been incorporated into accreditation and competency standards for several health

* Corresponding author.

E-mail addresses: Brittney.Meyer@sdstate.edu (B.A. Meyer), Teresa.Seefeldt@sdstate.edu (T.M. Seefeldt), Surachat.Ngorsuraches@sdstate.edu (S. Ngorsuraches), Lori.Hendrickx@sdstate.edu (L.D. Hendrickx), Paula.Lubeck@avera.org (P.M. Lubeck), Debra.Farver@sdstate.edu (D.K. Farver), Jodi.Heins@sdstate.edu (J.R. Heins).<http://dx.doi.org/10.1016/j.cptl.2017.07.015>

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professions.^{3,4} A recently updated review of reviews published by the Institute of Medicine⁵ concluded that collaborative knowledge, skills, and attitudes are fostered by interprofessional education. Also, enhanced collaborative practice and improved patient care are outcomes of interprofessional education, although the amount of evidence specifically supporting this is limited but growing. Even though the importance of interprofessional education is now recognized, there continues to be questions about how best to conduct interprofessional education and the optimal time in the curriculum to incorporate these activities. Current opinion is that interprofessional education needs to start at early stages and continue throughout the curriculum⁶⁻⁸ in both didactic and experiential learning.^{3,7,9}

For interprofessional education to be incorporated into the didactic curriculum and to give students earlier interprofessional experiences, the basic science courses in health professions curricula should be examined for interprofessional education opportunities. These courses are well suited for interprofessional education because many types of health profession programs utilize similar basic science courses. This would allow for integrated and collaborative learning. Pharmacology is one of these core science courses required by multiple health professions, including pharmacy and nursing.

Simulation, primarily computer-based simulation, has been used in teaching pharmacology for several years to help students understand difficult content and to demonstrate the application of pharmacology in clinical situations.⁹ It also has emerged as an important component of interprofessional education. The use of simulation allows students to experience how health professionals work together in a safe environment.⁸ Several types of simulations have been used in interprofessional education including online collaborative learning activities,¹⁰⁻¹⁴ virtual worlds,^{15,16} role playing,¹⁷ standardized patients,¹⁸ patient simulators,¹⁷⁻²⁵ and serious games.²⁶

Among these simulations, the use of high-fidelity patient simulators offers considerable promise due to the realistic nature of such simulations and the opportunity to apply knowledge to real life situations. Evidence exists supporting positive outcomes including improved safety from effective teamwork.²⁷ Engaging in interprofessional simulation training has been shown to enhance communication skills, which fosters collaboration and teamwork and reduces errors.²⁸ Additionally, knowledge deficits by health professionals regarding medications are a major contributor to adverse drug events.²⁹ Simulations that enhance students' knowledge of pharmacology, as well as provide an opportunity to practice interprofessional communication and teamwork, could be beneficial in reducing drug errors or adverse drug events and improving patient outcomes.

There are only a few literature reports of simulations incorporated into pharmacology courses or that specifically focus on learning pharmacology content. Some studies examined the benefit of high-fidelity simulation in pharmacology courses for one health profession,²⁹⁻³² but reports of interprofessional simulations in pharmacology are extremely limited in the literature. One study by Hassan et al.¹⁹ included medical students and surgical recovery room nurses in an interprofessional simulation on opioid pharmacology. While the results of this study showed that both groups felt that the simulation improved their knowledge on the clinical use of opioids, the extrapolation of the results to traditional pre-licensure interprofessional education may be problematic since nurses were involved instead of student nurses. Further research in this area is needed to fully understand the application of high-fidelity simulation in teaching pharmacology.

The overall goal of this research was to determine if an interprofessional pharmacology simulation with nursing and pharmacy students is feasible and to assess the impact of the simulation on nursing and pharmacy students' perceptions of interprofessionalism and pharmacology knowledge. Increased understanding of pharmacology content and positive reinforcement of interprofessional communication and teamwork may translate long-term into reduced medication errors or adverse drug events and improved patient outcomes and safety.

Interprofessional education activity

An interprofessional inpatient simulation was designed by collaborating South Dakota State University pharmacy and nursing faculty members, which included a patient case with supporting documents, a simulation script involving digoxin toxicity and need for vasopressor administration, and a debriefing guide. Content validity of the case study was determined through external review by a panel of experts. A pre- and posttest study design was conducted.

Both pharmacy and nursing faculty members had two major roles during the study. Their first role was to facilitate the simulation. Two high-fidelity patient simulators were utilized. Trained faculty adjusted them to simulate a patient with heart failure by changing blood pressure and heart rhythm because of digoxin toxicity per the step-by-step simulation script. Another role was to lead the debriefing at the end of the simulation. An informational fact sheet and guide for debriefing was provided before the simulation started.

Simulation participants included second-semester nursing students and second-year pharmacy students enrolled in pharmacology courses at South Dakota State University. Although the two health professions are enrolled in different pharmacology courses, the content for both groups included autonomic drugs at the beginning of the semester. All students had one or two previous interprofessional activities mostly in an ambulatory care setting. Each simulation group of seven or eight students consisted of three or four nursing students and three or four pharmacy students. The roles in the simulation were randomly assigned on the day of simulation. One pharmacy student role-played the lead pharmacist and one was a supporting or resource pharmacist. Two nursing students role-played the primary and secondary nurse. The remaining pharmacy and nursing students served as peer-evaluators (critics and/or supporters).

Prior to the start of the simulation, each group of students was given a short report with the patient's history and chart with admission orders. The primary and secondary nurses performed a physical assessment of the patient, while the lead pharmacy student reconciled the home medications with the patient's prescription vials and reviewed the patient's medications for drug-related

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