Simulation-Based Learning to Teach Blood Pressure Assessment to Doctor of Pharmacy Students

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ABSTRACT

Background: There is a lack of objective evidence supporting the use of simulation based learning education within the pharmacy curriculum by objective performance measures. The purpose of this prospective trial is to assess the use of simulation-based learning on students' ability to perform accurate blood pressure assessments, improvement on objective examinations of hypertension therapy, and assessment of student satisfaction with this unique teaching method.

Methods: The Pharmacotherapy of Cardiovascular Disease course at the University of Pittsburgh School of Pharmacy is taught during the second year of pharmacy school. Institutional Review Board approval was obtained through the University of Pittsburgh. Didactic lectures on performance of blood pressure assessment were combined with practice sessions with a computerized human patient simulator. Students were given an objective examination prior to and after the hypertension section of the course. Students were surveyed post-simulation to determine effectiveness of the learning experience.

Results: Overall, 97 students completed the patient simulation sessions and 95 of 97 (98%) completed the written examinations and surveys. Students showed significant improvement in blood pressure measurement with each practice session with the patient simulator.

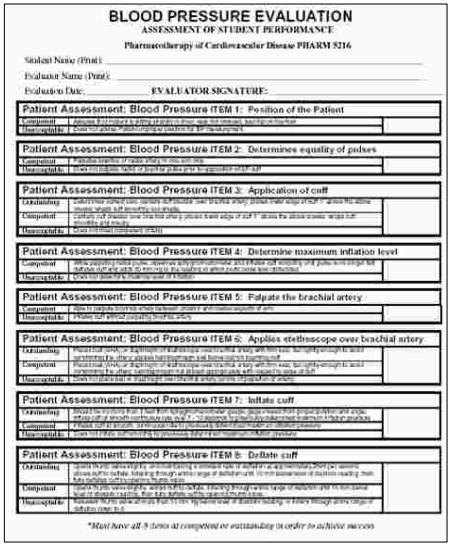
Conclusion: Simulation-based learning has been successful throughout healthcare education and can improve the level of competence of pharmacists. Pharmacy students show significant improvement in objective assessments of clinical skills performance and knowledge of the pharmacotherapy of hypertension. Further study is needed to document other benefits to students and faculty who participate in simulation-based learning in comparison with traditional approaches to education. This method of teaching leads to high levels of student satisfaction. By introducing "real-life" clinical scenarios and patients into the early pharmacy curriculum, pharmacy schools can produce pharmacists whom will provide improvements in overall patient care.

INTRODUCTION

Cardiovascular disease remains the leading cause of mortality in the United States. In 2003, the American Heart Association reported that over 65 million Americans have elevated blood pressure.[1] Significant evidence exists that pharmacists can improve the care of patients with cardiovascular disease, including hypertension,[2-6] and that pharmacist involvement improves clinical and economic outcomes.[7-9] Schools of pharmacy are challenged with preparing students to perform appropriate invention activities, such as BP monitoring, counseling on antihypertensive medications, and pharmacotherapeutic recommendations for management of hypertension. The standard of pharmacy education has been to use structured didactic lectures, patient case scenarios, problem-based learning (PBL), and clinical labs utilizing human actors to teach fundamentals of BP assessment and management of hypertension. Patient simulation and simulation-based learning (SBL) has been established in medical and nursing schools throughout the United States, but has not yet been widely accepted in pharmacy schools. The purpose of this prospective trial is to assess the use of simulation-based learning on students' ability to perform BP assessments, improvement on examinations of hypertension therapy, and student satisfaction with this unique teaching method.

METHODS

This study was approved by the IRB of the University of Pittsburgh Medical Center. All students were presented with grading rubric prior to classroom practice sessions.



BLOOD PRESSURE EVALUATION

ASSESSMENT OF STUDENT PERFORMANCE

Pharmacotherapy of Cardiovascular Disease PHARM 5216

Student Name (Print): _____

Evaluator Name (Print): _____

Evaluation Date: _____ EVALUATOR SIGNATURE: _____

Patient Assessment: Blood Pressure ITEM 1: Position of the Patient

Patient Assessment: Blood Pressure ITEM 2: Determines equality of pulses

Patient Assessment: Blood Pressure ITEM 3: Application of cuff

Patient Assessment: Blood Pressure ITEM 4: Determine maximum inflation level

Patient Assessment: Blood Pressure ITEM 5: Palpate the brachial artery

Patient Assessment: Blood Pressure ITEM 6: Applies stethoscope over brachial artery

Patient Assessment: Blood Pressure ITEM 7: Inflate cuff

Patient Assessment: Blood Pressure ITEM 8: Deflate cuff

*Must have all 8 items at competent or outstanding in order to achieve success

Patient Simulation Sessions: After didactic lectures on BP monitoring and management of hypertension, each student group (6 students) participated in a simulation session in a large classroom setting. Each group was oriented to the mannequin and each student performed a BP assessment with direct facilitator guidance. The simulation mannequin was brought into the classroom for a second practice session two weeks after the initial orientation. At the end of the semester, each student group completed a one hour simulation session at the WISER Center for a final practical skills evaluation. During this session, each individual student was graded on their ability to perform the appropriate steps to take a BP as well as the accuracy of that measurement.

Examinations and Surveys: All students were asked to complete an objective written examination prior to and after the hypertension section of the course. Also, students were asked to complete an anonymous survey pre-and post-simulation to assess students' attitudes toward their ability to accurately perform BP and their general thoughts on this novel method of learning.

Figure 1. Second Session: Facilitator Assisted

RESULTS

A total of 102 students were enrolled in the Pharmacotherapy of Cardiovascular Disease course and completed all three simulation sessions, while 93% completed the anonymous examinations and surveys.

Table 1. Class Demographics

Demographic	Result N=102
Gender	
Male	40
Female	62
Average Age (years)	21
Race	
Caucasian	95
Asian	6
African American	1
Students with prior degrees	8

Table 2. Students' Ability to Perform Accurate BP

Assessment	First Session	Second Session	Final Session	P value†
Average Score from Rubric (Total possible=8)	4.2	5.8	7.8	0.029
Accurate BP*	21.5%	65.6%	97.6%	<0.05

**Accurate BP was defined as within 5 mm Hg of the programmed BP*

†Difference between first and final session

RESULTS

Table 3. Pre- and Post-Simulation Exam Scores

Question	% Correct Pre-Simulation	% Correct Post-Simulation	P value
How many minutes should a patient rest in a sitting position before performing a blood pressure assessment?	53.8	95.9	<0.05
What foods or drinks may affect a patient's blood pressure assessment?	84	97.9	0.001
How do you determine maximum inflation level for a patient?	14.3	96.8	<0.05
At what rate should the cuff be deflated when listening for the systolic and diastolic blood pressure?	46.1	95.8	<0.05
The first sound heard when deflating the cuff is the diastolic pressure and the last sound heard is the systolic blood pressure. (True/False)	88.3	97.9	0.009

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