TEACHERS' TOPIC

A Chronic Disease State Simulation in an Ambulatory Care Elective Course

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Objective. To implement a chronic disease state simulation in an ambulatory care elective course and to assess the simulation's impact on students' perceptions of their empathy toward patients and of their counseling skills.

Design. The chronic disease state simulation occurred over 2 weeks. Students alternated playing the role of patient and pharmacist. As patients, students adhered to medication regimens, lifestyle modifications, and blood glucose or blood pressure monitoring. As pharmacists, students conducted patient interviews, and provided education and counseling. Empathy and counseling skills were assessed through course surveys, written reflections, and SOAP notes.

Assessment. Results from a cohort of 130 students indicated the simulation enhanced students' perceptions of their abilities to empathize with and counsel patients with chronic diseases.

Conclusion. The chronic disease state simulation provides a novel approach to develop skills needed for working with complex patient cases in ambulatory care settings.

Keywords: ambulatory care, empathy, chronic disease, patient counseling

INTRODUCTION

Ambulatory care pharmacists positively affect patient outcomes by encouraging self-care behaviors, promoting understanding of chronic diseases, enhancing adherence to medications and lifestyle modifications, and improving clinical indicators such as hemoglobin A1C, glucose, and lipid profiles.¹ Effective ambulatory care pharmacists are knowledgeable about disease states and can establish meaningful relationships with patients through strong communication skills, including empathy. Empathy is an important skill in patient interactions, including counseling, because patients who feel listened to are more likely to fully explain their symptoms and provide important details about their condition.²

In order for students to master these skills, the pharmacy curriculum must establish learning opportunities to ensure students are prepared before encountering patients. These experiences can be achieved through active-learning activities.³ The Accreditation Council for Pharmacy Education (ACPE) encourages active-learning techniques involving actual or simulated patients, pharmacists, or other health care individuals to foster critical-thinking and problem-solving skills in students. Active

learning uses 4 key elements of learning: talking and listening, writing, reading, and reflecting.⁴

Compared to didactic teaching, where students passively receive information, active learning allows students to be more invested in the process through assimilation of all learning elements. This can increase motivation as students understand the "real world" use of knowledge learned in the classroom. In addition, active learning encourages complex thought processes, critical-thinking skills, exploration of attitudes and values, and feedback.³

The impact and effectiveness of active-learning activities are well-studied in health care disciplines. Studies with nursing students and nonclinical direct care workers showed that participating in problem-based learning classes improved critical thinking, knowledge, empathy, motivation for learning, and an appreciation of caring for the sake of the patient, instead of the disease.^{5,6} Another form of active learning is through patient simulation. Pediatric medical residents who participated in a week-long scenario that involved assuming the role of a struggling patient, reported increased perceptions of empathy, compassion, and ability to relate to patients.⁷

In a study by Dang et al, pharmacy students who played the role of a patient who was culturally, socially, or economically challenged (eg, such as being illiterate, hearing-impaired, ethnically diverse, or homeless) developed optimal clinical patient care skills and social and cultural competency.⁸ Other studies using diabetes

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simulations demonstrated a positive change in students' attitudes toward patients with diabetes, increased confidence in performing and teaching diabetes self-management skills,^{9,10} and improved self-reported empathy.¹¹ Because empathy is an important component of the patient-pharmacist relationship, simulation exercises that provide students with tools for developing empathy for patients and disease states should be incorporated into the pharmacy curriculum.

To reflect on the evolving role of the pharmacist as a member of the health care team, the Center for Advancement of Pharmacy Education (CAPE) revised its outcomes in 2013 to describe not only the knowledge, skills, and abilities practicing pharmacists need, but also the manner in which educational institutions can best foster students' professional development and meet those needs.¹² The purpose of the revised outcomes is to extend the education of the pharmacy student beyond general pharmaceutical knowledge and skills to focus on an individual's practice approach, emphasizing professionalism, self-awareness, reflection, and skills needed to become a successful patient-centered pharmacist.¹²

In 2016, ACPE will revise its standards to embrace 4 of the essential domains of the CAPE outcomes, which ultimately must be met in the pharmacy curriculum. These include foundational knowledge, essentials for practice and care, approach to practice and care, and personal and professional development.^{12,13} Clinical simulations provide an active-learning strategy to meet these new standards.

The chronic disease state simulation at Chicago State University College of Pharmacy was designed for students to experience first-hand the life of a patient with multiple chronic disease states and how to manage a patient with these conditions. Our goal for students was to develop a sense of empathy, or an understanding of the variables and life factors that can affect and complicate patient care. These factors may include personal dilemmas, patients' understanding of their treatment plan, knowledge of their health conditions, and complexity of their treatment regimen. In comparison to other simulated exercises, students acting as patients were required to take medications, implement healthy lifestyle behaviors, and incorporate self-monitoring for a wide range of disease

states to reflect a more comprehensive patient experience. Furthermore, students acting as pharmacists were able to experience the challenges in providing optimal care for patients with chronic disease states.

The objective of this study was to determine the impact on students' perceptions of their abilities to empathize with and counsel patients after a chronic disease state simulation in an ambulatory care elective course. Results from a cohort of students over 4 years, from 2011 through 2014, are reported.

We believed the simulation was an innovative activity that provided a novel approach for students to gain the skills necessary to become patient-centered practitioners, while also addressing the CAPE Outcomes and ACPE Standards. We hypothesized the activity would help students become better practitioners by enhancing their counseling skills and perceptions of empathy toward patients.

DESIGN

The ambulatory care elective at the college is a 2-credit hour course that introduces third-year pharmacy students to pharmacotherapeutic concepts encountered by ambulatory care pharmacists. The goal is for students to become competent in concepts of pharmacotherapy and apply these skills to the management of chronic conditions encountered in ambulatory care patients. Learning objectives (Table 1) focus on the analysis and synthesis components of Bloom's Taxonomy, with a goal of building upon knowledge and comprehension skills developed in previous pharmacy courses. Students are introduced to the concepts of patient counseling and empathy in their first professional year via lecture during the professional practice course. Empathy is defined to students as understanding or appreciating how someone feels, including variables and life factors that can affect and complicate patient care. It is only after students are able to incorporate these variables in the management of patients' medical needs that they are said to have developed empathy. These skills are reinforced in the second professional year via lecture and simulated prescription and self-care patient counseling sessions in a pharmacy skills laboratory course. In addition, students practice these skills with real patients during introductory pharmacy practice

Table 1. Ambulatory Care Course Learning Objectives

1.	Describe the role and responsibilities of pharmacists in an ambulatory care practice setting.
2.	Analyze current practice guidelines for ambulatory care disease states and apply to clinical decision making.
3.	Design treatment plans for common disease states in ambulatory care pharmacy using evidence-based medicine.
4.	Evaluate medication regimens for appropriateness, efficacy, and cost effectiveness.
5.	Compare and contrast alternative medication options with first-line therapies for safety and efficacy.
6.	Develop empathy for challenges patients with multiple chronic disease states face.

experiences (IPPEs) in various settings, including the community, institutional, and public health arena in the first and second professional years.

The ambulatory care elective course was divided into 2 parts and occurred over a 15-week period. The first part consisted of pharmacotherapeutic review conducted through group quizzes, case-based application, and critical-thought discussions. Students were given relevant articles and supplemental resources such as current practice guidelines to read. The second part, which occurred over the last 2 weeks of the course, consisted of the chronic disease state simulation activity, which was done in pairs, with students alternating the roles of pharmacist and patient. The disease states were a combination of topics previously covered in the course. They slightly varied

year to year based on student and facilitator interests and included hypertension, diabetes, dyslipidemia, rheumatologic disorders, heart failure, osteoporosis, anticoagulation, thyroid disorders, respiratory diseases, and depressive and anxiety disorders.

Each patient received a case vignette, medication list, mock medications (simulated through candy), glucometer, glucose test strips, lancets, alcohol swabs, and, depending on disease state, insulin (simulated with normal saline), a mock inhaler, a peak flow meter, and/or a blood pressure monitor. Patient cases included anywhere from 3-7 disease states and 5-10 medications. Every case included diabetes, so that students would gain experience with blood glucose testing. An example of a patient case is in Figure 1. Pharmacists received their

HR is a 69 year old with multiple disease states. HR takes warfarin for atrial fibrillation and INR has been fluctuating a lot lately. HR has been advised by his primary care provider (PCP) to avoid vitamin K containing foods since it's been difficult for HR to stay consistent. HR was also instructed not to drink alcohol due to the bleeding risk. HR was also advised to monitor fasting blood glucose (FBG) and pre-dinner blood glucose (BG) every day and to avoid snacking at night due to recent weight gain and elevated FBG readings. The PCP referred HR to the pharmacist disease state management clinic for more optimal control of his chronic conditions.

Past Medical History:

- Type 2 diabetes x 10 years
- Atrial fibrillation x 7 years
- Osteoporosis x 2 years
- Dyslipidemia x 10 years
- Hypertension x 10 years

Current Medications

- Insulin glargine 12 units SC qpm
- Warfarin 10mg PO daily except 5mg MWF
- Ibandronate 150mg PO monthly –next dose due this Friday
- Glyburide 10mg PO daily
- Lisinopril 5mg PO daily
- Atorvastatin 10mg PO daily
- Fenofibrate 145mg PO daily

Allergies/ADR: Niacin-flushing

Labs (today, fasting): A1c: 7.5%, TG:180, Chol: 175 HDL: 57, LDL: 82, Scr: 1.2, Na: 141, K: 4.7, Cl: 101, Glucose: 162, BUN: 18, ALT: 23, AST: 29, Dexa scan T-score -2.1, Vitamin D level: 28, Ca: 9.5, EKG: normal

Date	INR	Warfarin Dose
08/26/14	2.75	10mg daily except 7.5mg MWF
09/10/14	4.50	Hold 1 dose, then 7.5mg daily except 10mg MWF
09/24/14	2.24	7.5mg daily except 10mg MWF
10/22/14	1.56	10mgx2, then 7.5mg daily except 10mg MWF
11/03/14	3.40	5mgx1, then 10mg daily except 5mg MWF
11/10/14	2.54	10mg daily except 5mg MWF
Today	4.25	

Self-Monitoring of Blood Glucose
(SMBG)

Date	FBG (mg/dL)	Before dinner BG (mg/dL)
Day 1	145	70
Day 2	146	64
Day 3	143	58
Day 4	165	70
Day 5	138	82
Day 6	139	67
Day 7	141	71

Other info: previously tried metformin and experienced diarrhea

Figure 1. Example Patient Case.

assigned patient's case vignette, which included the patient's disease states, current medications, laboratory parameters, and suggested lifestyle recommendations made by the patient's primary care provider. Pharmacists met with their patients twice, once before the simulation experience and once after.

At the first encounter, the pharmacist was required to counsel on medications, perform physical assessments, educate on devices, and recommend lifestyle modifications. The pharmacist also formatted a medication calendar to simplify medication administration and offered suggestions to enhance regimen adherence. Patients received all supplies, instructions, and medications at the first encounter, and were instructed to adhere to the parameters set forth by each case vignette and recommended by their pharmacist.

All patients were expected to monitor blood glucose. Those on insulin were asked to count carbohydrates, those with hypertension were to follow a sodium-restricted diet, and those prescribed warfarin were to follow a consistent vitamin K intake. All patients, regardless of disease states, were counseled on following individualized guideline-based lifestyle recommendations including exercise, alcohol moderation, and smoking cessation. The student "patient" was to take note of any challenges and obstacles throughout the experience. These challenges were considered part of the students' process of developing empathy.

Students in the role of pharmacists were to consider individual economic, cultural, and socioeconomic factors that may impact individual care and take this information into account when formatting an individualized care plan—another process to help students develop empathy toward patients. For example, many students, while playing the role of the patient, expressed the issue of medication cost. When making medication adjustments, the pharmacist was expected to choose a lower cost alternative, if possible.

To make the cases more complicated and assess clinical reasoning, the pharmacists were presented with an unexpected adverse event situation (eg, hypoglycemia or hyperglycemia) or a clinical question (eg, peri-procedural anticoagulation) during the week of the simulation. Pharmacists were expected to respond with a clinical plan to the course facilitator(s) and their patient within 24 hours. This was done in order to simulate real-life occurrences. Students were given formative feedback on their action plan.

At the conclusion of the week-long experience, pharmacists interviewed patients with a focus on the overall experience. Pharmacists were provided with a data collection sheet (Figure 2) to help guide their final encounter. This interview time was also used to review the patient's blood glucose and, if indicated, blood pressure readings, and to discuss any barriers to adherence and adverse effects

from the medications. Students playing the role of the patient were encouraged to be as honest as possible in answering questions and were to augment their patient scenario by providing information regarding their occupation and social support network.

After one week, patients and pharmacists switched roles so every student in the class could have both experiences. A synopsis of the patient and pharmacist responsibilities is in Figure 3. As a patient, students discussed the experience in a reflection paper, using the components in Table 2 as a guide. As pharmacists, students wrote a detailed SOAP (subjective, objective, assessment, plan) note. The subjective and objective information from the patient interview, physical examination, and patient case was used to come up with a detailed assessment and plan, which also included patient counseling points.

Students were asked to turn in the data collection sheet used during the final patient encounter prior to writing the SOAP note. The course facilitators modified these sheets as necessary, usually altering the blood glucose, blood pressure readings, and/or addition of adverse effects to more accurately simulate real life experiences. These modifications allowed pharmacists to make drug therapy changes and practice critical-thinking skills. The SOAP note and reflection were worth 50 points each (100 points total, 25% of total course grade). Up to 5 points extra credit could be earned in the course for checking more than 85% of the recommended blood glucose readings, one of which was a 3am glucose assessment.

At the conclusion of the course, a paper-based survey was administered to all students to assess perceptions of meeting course objectives. The survey included targeted questions about the chronic disease state simulation and consisted of 11 questions using a 5-point Likert scale (1=strongly agree to 5=strongly disagree). We only reported on 8 of the 11 questions (Table 3). The 3 questions not included reflected other components of the course related to course readings, patient cases, and group quizzes, which were not related to the objective of this study. Some of the survey questions reflected the whole course in general; we chose to include them because the chronic disease state simulation was a substantial component of the course. The survey also contained 5 free-text questions on students' favorite and least favorite topics, course strengths, areas for improvement, and suggestions for future topics.

Survey results include 4 course offerings, starting from the year of inception of the course in 2011. SOAP notes and reflection grades were reported as mean scores of the 4 cohorts. Results were tallied using Microsoft Excel, and the statistical analysis was computed using GraphPad Prism 6 (GraphPad Software, Inc., La Jolla, CA). The surveys, SOAP notes, and reflection grades

Patient Name/Number: _____

Reason for Consult: Disease state management

History of Present Illness (HPI): Ask about patient's experience in the last week, how are they doing overall?
Any problems/difficulties?

Confirm PMH:

Social Hx:
-EtOH:
-Tobacco:
-Illicit:
-Diet: If given specific recommendations on diet (carbohydrate counting, limiting vitamin K due to warfarin, or reducing salt/fat intake), was patient able to adhere with these recommendations? What were the limiting factors that prevented adherence?
-Exercise:
-Occupation:

Medications List:
Review medications with the patient and ask how the patient takes each one.
OTC/herbals:
Allergies/reaction:

Medication Adherence:

- How do you remember to take your medications? Ex. Use pillbox?
- How many doses of medicines did you skip in the last week?
- Reason for missing doses?
- What do you do when you miss a dose?

Ask about adverse effects: (This list is not all inclusive)

CHEST PAIN SOB N/V/D/C HA DIZZY LIGHTEADED

DRY COUGH SWELLING BLOODY/DARK STOOL MUSCLE PAIN

Has the patient experienced any symptoms of hypoglycemia?

How many? When? What specific symptoms? What was used to treat?

SMBG/how often testing: Reasons for not checking?

Last ophthalmologist appointment: _____
Last podiatry appointment: _____
Does patient perform daily foot examinations? _____

Immunizations:
-Influenza _____
-Pneumococcal _____
-Hepatitis B _____
-Other vaccinations that should be recommended based on concurrent disease states, and demographic factors?

O:
SMBG/BP

Date (day)	Before Breakfast (mg/dL)	2h after Breakfast (mg/dL)	Before lunch (mg/dL)	2h after lunch (mg/dL)	Before dinner (mg/dL)	2h after dinner (mg/dL)	Bedtime (mg/dL)	Blood Pressure (mmHg)
1								
2								
3								
4								
5								
6								
7								

Physical Examination:
Blood Pressure: Pulse: Foot exam results: Peripheral edema:

Pharmacist Name: _____

Figure 2. Data Collection Sheet Follow-Up Visit.

Figure 3. Pharmacist and Patient Responsibilities in Chronic Disease State Simulation.

were reported with descriptive statistics, and the difference among means of each question response was compared using one-way analysis of variance (ANOVA) to determine if there was any difference in the responses from each cohort, and a Bonferroni test to assess for multiple comparisons. An a priori level of $\alpha=0.05$ was used for all statistical analysis. This study was approved by the Chicago State University Institutional Review Board (IRB).

The results include the compilation of assessments of 130 students in 4 cohorts of classes from years 2011 through 2014. Each year varied in course size ranging from 26 to 42 students. The same survey was used in all 4 offerings, with the exception of one question that was changed after the first year. The new question assessed students' perceptions of the impact of the ambulatory care elective in preparing them for an advanced pharmacy practice experience (APPE) in ambulatory care.

The survey was voluntary and administered anonymously via paper during the last day of class. Paper surveys

were chosen out of convenience because not all students had laptops, and response rates for electronic surveys historically had been low at our institution. Measurement of perceived empathy toward patients and effectiveness in counseling ability were assessed in the following survey questions: "After completing the chronic disease state simulation, I have greater empathy for patients with multiple chronic disease states including diabetes;" and, "After completing the chronic disease state simulation, I can more effectively counsel patients on managing their chronic disease states."

Students' perceptions of their experience also were assessed qualitatively via written reflections in response to the question: "How could this experience help you empathize with patients who have multiple chronic disease states?" Additionally, SOAP notes were evaluated to determine if appropriate patient counseling information was included. Within the SOAP note rubric, there were assigned components in the plan for patient counseling recommendations.

Table 2. Chronic Disease State Reflection Questions and Summary of Responses

Number	Question	Common Themes
1	Provide a detailed description of your experience as a patient with multiple chronic disease states.	<ul style="list-style-type: none"> ● Thoughtful feedback regarding the daily struggles of taking medications, self-monitoring, and making lifestyle changes ● This was an “eye opening experience” and “much tougher” than anticipated
2	What were some of the challenges of this experience?	<ul style="list-style-type: none"> ● Adherence to blood glucose or blood pressure monitoring ● Poking fingers and injecting insulin ● Following a special diet ● Carrying supplies in public ● Coordinating self-monitoring activities with classes and work schedule
3	What impact did it have on your lifestyle? Did you find it difficult adhering to specific dietary recommendations? Were you able to follow the lifestyle modifications recommended to you?	<ul style="list-style-type: none"> ● Embarrassment with carrying supplies ● Difficulty finding a place to inject insulin or perform blood glucose or blood pressure monitoring discreetly ● Few students were able to follow every recommendation made by their pharmacist due to “too many changes at one time” ● Exceptions were those already following a similar diet or exercise plan
4	Over the course of the week, how often did you forget to check your glucose and/or blood pressure or take medications? What caused you to forget? What strategies did you use to help yourself remember?	<ul style="list-style-type: none"> ● The majority of students (~80%) checked home blood glucose more than 85% of the time, confirmed by glucometer readings ● Adherence rates were variable and generally lower for insulin injections vs oral medications ● Common barriers included needle phobia, embarrassment with carrying supplies, erratic schedule, family obligations, oversleeping, and skipping meals ● Strategies to remember including pairing medication with daily activities like food, coffee or brushing teeth, asking a family member for a reminder, setting watch/cell phone alarms
5	How could this experience help you empathize with patients who have multiple chronic disease states?	<ul style="list-style-type: none"> ● Have a greater understanding of competing priorities and the importance of having a strong social support network to stay motivated ● More likely to offer patients an individualized plan taking into consideration the patients’ lifestyle, barriers to care, and motivation level ● Recommend gradual changes such as reducing salt gradually instead of immediately limiting to 2300mg/day ● More compassionate toward patients’ concerns and stressors

EVALUATION AND ASSESSMENT

Out of 130 surveys administered, we received 120 completed surveys, an overall response rate of 92.3%. Survey results indicate that 100% of students either agreed or strongly agreed with the statement, “After completing the chronic disease state simulation, I have greater empathy for patients with multiple chronic disease states including diabetes;” and 95.8% of students agreed or strongly agreed with the statement, “After completing the chronic disease state simulation, I can more effectively counsel patients on managing their chronic disease states.”

Of note, 91.5% of students agreed or strongly agreed with the statement, “After completing this elective, I feel

more prepared for an ambulatory care APPE.” The free-text question confirmed that the majority of students considered the chronic disease state simulation their “favorite” component of the course, followed by the weekly written SOAP notes. Table 3 shows the average mean scores (range 4.4-4.9) for each survey question. The difference in the mean scores for each cohort was not significant ($p=0.30$).

The written reflections, completed by all 130 students enrolled during the 4 years, were evaluated according to a faculty-developed rubric. Each reflection was to be single-spaced and 1½ -2 pages long. Because grading can be subjective, only course coordinators graded the reflections. There were 5 categories of questions, and each

Table 3. Students' Perceptions of the Ambulatory Care Elective Course

Question	2011	2012	2013	2014	St. Dev	AVG
1. I would recommend this elective to other students.	5.0	4.9	4.9	4.7	0.09	4.9
2. After completing this elective, I feel more prepared for an ambulatory care APPE.	NA	4.4	4.6	4.5	0.1	4.5
3. After completing this elective, I am more interested in a career in ambulatory care.	4.6	4.5	4.2	4.6	0.2	4.4
4. Simulating a patient with multiple chronic disease states including diabetes was more difficult that I thought it would be.	4.6	4.4	4.5	4.6	0.1	4.5
5. After completing the chronic disease state simulation, I have greater empathy for patients with multiple chronic disease states including diabetes.	4.8	4.8	4.9	4.8	0.04	4.8
6. After completing the chronic disease state simulation, I can more effectively counsel patients on managing their chronic disease states.	4.7	4.3	4.4	4.9	0.2	4.5
7. This course enhanced my ability to adjust and monitor medication regimens in ambulatory patients.	4.7	4.4	4.5	4.4	0.1	4.6
8. This course enhanced my ability to justify and rationalize therapy decisions in ambulatory patients.	4.7	4.4	4.6	4.4	0.1	4.6
<i>p</i> value*						0.3

Mean scores based on a 5-point Likert scale (1=strongly disagree, and 5=strongly agree); APPE=advanced pharmacy practice experience

*Anova analysis of the 2011, 2012, 2013, and 2014 cohort. Alpha level set at 0.05

was allotted a similar number of points based on completeness of the answer. Points were deducted for unanswered questions, incorrect grammar/spelling, incorrect length, or poor flow.

Students were encouraged to be honest about their experience and did not lose points for discussing poor adherence or any negative aspect of the experience. Scores for the reflections had an average of 98.5%. Reflection grades were similar from year to year, although we did find a significant difference in 2014 vs the 2011, 2012, and 2013 cohorts ($p=0.0007$). All reflections were evaluated at least twice, once for grading purposes, and a second time to determine common keywords and themes. The most common themes within the reflections are reported in Table 2.

Overall, students provided thoughtful feedback regarding the daily struggles that patients with multiple chronic disease states go through. They also discussed how this experience increased their empathy toward these patients. Students reported difficulty with adherence to blood glucose or blood pressure monitoring, lifestyle changes, insulin injections, and oral medications. Students were incentivized to check blood glucose: they were offered 5 extra credit points for testing more than 85% of the recommended time, which was added to their overall course grade. More than 80% of students met this measure as reported in their reflections and confirmed by glucometer readings.

Reported medication adherence was higher overall for oral medications than for insulin. Many students struggled with making dietary changes, unless they were already following a similar recommended diet and exercise plan. Some students reflected on personal experiences

with family members who had chronic diseases, stating that they could now better understand and empathize with the families' challenges. Nearly all students felt this experience would benefit them in preparation for working in direct patient care. Both the responses on the reflections and surveys indicated the activity positively affected students' abilities to empathize with their patients and influenced how they would counsel future patients.

Final SOAP notes incorporated information obtained during the patient interviews, objective data from the clinical scenarios, and current practice guidelines. In this process, students were expected to analyze practice guidelines, evaluate the patient's medication regimen for appropriateness, efficacy and cost-effectiveness, and design a treatment plan using evidence-based medicine. The notes were graded according to a faculty-developed rubric similar to SOAP note assessment in the college's therapeutic courses. Subjective information included history of present illness, past medical history, family history, social history, and medications. Objective information included allergies, physical examination information, labs, self-monitoring data, and test results. Full points were awarded for assessments that identified and prioritized all problems and addressed issues in the order of most acute condition. Plans were evaluated based on clinical approach, drug selection, monitoring parameters, and patient education.

Components in the SOAP note plan were used as evidence to support the study objective of improving patient counseling skills, which included points for making realistic patient education recommendations and providing patient-specific education. Additionally, in the clinical approach, students earned points for considering the

relationship between medical conditions and patient-specific factors, such as lifestyle, cultural and economic influences, and comorbid disease states.

The full SOAP note rubric is in Figure 4. Average scores were in the B range (80-89%). Only the course coordinators graded these assessments to reduce subjectivity. Completing this assignment with an “A” or a “B” was a marker of meeting the course learning objectives in Table 1. Students most often lost points for selection of drug therapy or monitoring parameters. A comparison of mean scores from year to year (Table 4) showed a difference between cohorts ($p=0.043$); however, a significant difference was only found between the 2014 and 2012 cohorts.

DISCUSSION

We hypothesized that the chronic disease state simulation would enhance students’ perceptions of their empathy and counseling skills. Results from the course surveys, reflections, and SOAP notes support this hypothesis. In addition, evaluation of final SOAP notes indicated that students met course learning objectives and successfully applied previous knowledge learned in didactic courses to their patient cases. In doing so, students achieved higher levels of Bloom’s Taxonomy, including analysis and synthesis. The chronic disease state simulation supported ACPE Standards 2016 and encouraged the provision of patient-centered care by allowing each student to treat each individual according to the specific characteristics as designed in each scenario (Table 5).

The simulation incorporated active learning with the expectation that students had already mastered “learner” content (CAPE Outcome/ACPE Standard 1). Therefore, the simulation primarily addressed practice skills, problem-solving, and personal and professional development (CAPE Outcomes/ACPE Standards 2, 3, and 4, respectively).^{12,13} In this simulation, students developed an individualized, evidenced-based plan for each patient and incorporated social, cultural, and economic factors. Additionally, through health promotion tactics, which focused on health and wellness, they were required to emphasize the importance of strategies to prevent complications of chronic disease states, supporting Standard 2, essentials for practice and care.^{12,13}

Standard 3 is focused on students developing clinical problem-solving skills, recognizing cultural differences, and overall being patient advocates.^{12,13} In this simulation, the student was required to practice clinical decision-making, while taking into account individual patient factors, addressing problem-solving skills, and recognizing patient individuality. The student pharmacist worked in collaboration with the patient to form a feasible and realistic

therapeutic plan, enabling the patient to be an integral participant in their own care, promoting patient advocacy.

Standard 4 is focused on personal and professional development.^{12,13} The intent of our activity was for students to develop a greater sense of empathy toward patients and stronger confidence in overall counseling skills. The reflection at the conclusion of the activity allowed students to identify challenges, barriers, and struggles, and it encouraged them to develop methods to overcome these barriers from the patient and practitioner perspective.

There were no significant differences in surveys between the 4 cohorts, suggesting the impact of the simulation was consistent among each course offering. There were significant differences in the SOAP note grades between the 2014 and 2012 cohorts and in reflection grades among the 2014 and other cohorts. Although significant, the mean reflection scores from 2014 versus 2012 were only one point different (0.5%), and the mean 2014 SOAP note score was approximately 2 points lower vs other years (1%). There were no major curricular or course sequencing changes over the 4 years to account for the differences. Possible explanations for the differences include variation from year to year in class composition, disease states covered, and types of patient cases.

Simulations demonstrate positive outcomes, including improvements in empathetic behavior and confidence in self-management skills.⁹⁻¹¹ The chronic disease state simulation employed in our study had several novel approaches. While previous simulations focused on diabetes, this simulation included multiple chronic disease states and allowed students to engage in various activities such as monitoring blood pressure, monitoring blood glucose, and administering mock-inhaled medications. Students also had the opportunity to experience this simulation from the perspective of the patient and pharmacist. Other aspects included using “Warheads,” an unpleasant sour candy that could affect patient adherence and presenting unexpected clinical scenarios to test students’ abilities to adapt new plans based on their patient’s current status.

There were challenges to this instructional strategy, such as the cost of supplies. To save costs, we used expired test strips and, later on, limited the class size to 30 students. Infection control remains a concern. Students were supplied with sharps containers, which were collected at the end of the simulation for proper disposal. Single-use lancing devices were given to students with 1 glucometer per student. Ample supplies were available to ensure single-use needle injections for mock insulin. Students also had training on infection control during previous courses.

Overall Organization (5 points): assessed by the presence of any spelling/grammar errors, written clearly/concisely/professional, and uses appropriate medical technology

Subjective (5 points)		
Components	Description	Score
HPI	Includes overview of patient, age, sex, and reason for the visit	1 point each
PMH	Active medical problems and includes past illnesses, hospitalizations and immunizations	
FH	Includes age and health/illness/death of first degree relatives	
SH	Includes home, environment, work status, substance use, diet/exercise.	
Medications	Includes ALL current medications: Rx, OTC, and herbals. Includes name, dose, route, frequency, duration, and indication for use	_____/5

Objective (5 points)		
Components	Description	Score
Allergies	Includes name of medication & describes allergic reaction Includes statement NKDA if applies	2 points for SMBG or BP, 1 point for all other
PE	Height, weight, BP, foot exam, any other relevant PE	
Labs	Includes dates taken and results	
SMBG and/or BP readings	A list of patient's home blood glucose and/or blood pressure readings	
		_____/5

Assessment (5 Points)			
Target (5)	Acceptable (4)	Below Target (3)	Score
Identifies and prioritizes all problems AND addresses clinical issues in order of most acute condition.	Identifies and prioritizes most problems and/or missing problem(s) is NOT detrimental to the patient.	Does not identify or prioritize any problems and/or missing problem IS detrimental to the patient.	_____/5

Plan (30 points)

Clinical Approach/ Therapeutic Plan	Criteria	Score
	All pertinent information needed to make an appropriate recommendation is included Realistic therapeutic goals are identified for each drug related problem Thoroughly takes into consideration the relationship between medical conditions and patient specific factors, such as lifestyle and comorbid disease states	2 points each
	Plan is complete, appropriate and accurate Plan is patient and disease specific	_____/10

Drug Selection	Criteria	Score
	Drug therapy selected is appropriate and patient specific Drug therapy selection incorporates evidence-based medicine Drug –drug interactions, drug-disease state interactions, and drug allergies/intolerances were taken into consideration Dosing selected is appropriate. An exact dose and dosing interval is written. Adverse drug events are considered and anticipated, and dictated drug selection.	2 points each
		_____/10

Monitoring Parameters/ Patient Education	Criteria	Score
	Identifies all monitoring parameters Desired endpoints are specific, appropriate, and realistic Frequency of monitoring is reasonable and appropriate Realistic patient education recommendations are made Patient education is patient-specific	2 points each
		_____/10

Total Score: ____/50 points

Figure 4. Chronic Disease State SOAP (Subjective, Objective, Assessment, Plan) Note Grading Rubric.

Because students' glucose readings often are within normal ranges, there had to be a mechanism for providing pharmacists with replacement readings for glucose, blood

pressure, and laboratory values to make realistic and meaningful clinical recommendations. This required time, as all cases needed to be carefully reviewed by

Table 4. SOAP* Note and Reflection Mean Scores per Class Year

Year	Total Students	SOAP Note****	Reflection****
	(N)	Mean (SD)	Mean (SD)
2011	26	42.2 (1.2)	49.5 (4.7)
2012	42	42.3 (1.7)**	49.4 (2.2)
2013	32	42.6 (1.8)	49.2 (5.3)
2014	30	40.2 (1.8)**	48.6 (4.4)
<i>p</i> value***		0.043	0.0007

*SOAP (subjective, objective, assessment, plan) notes and reflections out of a maximum of 50 points

**Significance found between the 2014 and 2012 cohort

***Significance found between the 2014 vs 2011, 2014 vs 2012, and 2014 vs 2013 cohort

****Alpha level=0.05

course facilitators. The chronic disease state simulation also involved a significant amount of faculty time in creation of the patient cases and in grading, which included 1 SOAP note and reflection per student, as well as logistical

factors such as attainment and distribution of supplies. Strategies to help reduce faculty workload were limiting class size, having 2 course coordinators, and using the help of other facilitators. Once the cases were initially created, they could be reused each year with minor adjustments. It also was possible to give more than one student the same case or a case with minor differences because they added their own characteristics to it.

Overall, student survey response rates were high. Students' reflections and surveys indicated a positive impact on students' perceptions of empathy for patients with multiple chronic disease states. However, there were some limitations. A validated empathy scale was not used. Based on our background research, our activity was the first of its kind, and thus, we created a short, easy to complete survey that evaluated all activities in our simulation. Because the same survey was used for each cohort, the first cohort served as the pilot class for this study. From the first cohort, only one question was changed from the original survey as a result of responses.

Table 5. Chronic Disease State Simulation Activities Paired with ACPE* Standards¹³

ACPE Standard	Activities Addressing the Standard
1. Foundational Knowledge	Assumed to be proficient in the foundational sciences, with the student already demonstrating mastery of learner content.
2. Essentials for Practice and Care	
2.1. Patient-Centered Care	The student pharmacist uses subjective and objective information to formulate an evidence-based clinical plan that takes into account patient-specific factors and includes efficacy and toxicity monitoring parameters. Plans incorporate pharmacologic and nonpharmacologic modalities as well as lifestyle modifications.
2.3. Health and Wellness)	The student pharmacist encourages preventative and lifestyle techniques to mitigate disease, minimize risk of complications, and prevent other chronic disease states. This is done through counseling on lifestyle and behavior modification.
3. Approach to Practice and Care	
3.1. Problem Solving	The student pharmacist is required to identify potential patient problems and concerns that may impact delivery of care and pose a reasonable solution to the issue. A clinical scenario is posed to the student pharmacist, which may comprise of severe hypoglycemia, peri-procedural management of anticoagulation, or a severe adverse effect of a medication. The student utilizes critical-thinking skills to solve the problem and provide a solution.
3.5. Cultural Sensitivity	The student pharmacist takes into account individual, cultural, and religious factors that may affect delivery of the patient care plan. Student pharmacists are encouraged to work together with the patient to find alternative solutions that reflect patient preferences.
3.6. Communication	The student pharmacist is required to prepare a concise and comprehensive SOAP** note that is communicated in the medical chart to the physician provider.
4. Personal and Professional Development	
4.1. Self-awareness	Through the reflection process, the student as a patient must identify barriers and obstacles that prevented their own implementation of the clinical plan. This helps to develop a greater sense of empathy of the challenges that patients may experience while navigating the health care system and adhering to clinical recommendations.

*ACPE = Accreditation Council for Pharmacy Education

**SOAP=Subjective, Objective, Assessment, Plan

Another limitation concerning the survey included its one-time administration at the end of the course. It may be beneficial to distribute a validated pre/post survey to measure quantitative differences in empathy before and after completing the simulation. Other limitations were that the simulation only occurred at one institution, so generalizability is unknown. Also, because this was an elective course, there may have been selection bias, as those interested in ambulatory careers likely enrolled in the course.

This study assessed perceptions, so it is unknown if actual empathy and patient counseling skills improved. During the pharmacist-patient interviews, course facilitators listened to patient interviews and provided formative feedback, but there was no direct objective assessment. Logistically, it would be difficult to formally assess all 30 student interviews, although with additional facilitator help this could be a future direction, where students are formally evaluated on their abilities to empathize with and counsel patients during their pharmacist-patient encounters.

Expressing empathy is an important patient counseling skill, and we hoped that increased empathy would translate into improved patient counseling. Patient counseling was indirectly assessed through the SOAP note rubric. A comprehensive SOAP note that included excellent patient counseling components had to take into account all subjective and objective information, and accurately assess it to create the patient-specific plan. Most students scored well on these SOAP notes, indicating students did well in terms of providing patient-specific counseling and education.

This instructional strategy provided a novel approach to preparing students for experiences in direct patient care. Such strategies may become increasingly important as most doctor of pharmacy students will pursue careers with some aspect of direct patient care, even if they do not work in an ambulatory care setting. This study adds to the body of evidence of the effectiveness of patient simulations in the classroom. Although other simulations have been done, we are not aware of any up until the time of this publication that included such a variety of patient disease states, medications, lifestyle modifications, and self-monitoring. Pharmacists encounter patients with multiple types of chronic disease states, and our simulation provided a comprehensive instructional design to prepare students for such scenarios.

SUMMARY

This study involved a 2-week chronic disease state simulation experience where students played the roles of pharmacist and patient. It included multiple

pharmacist-patient encounters. Survey results and student reflections indicate this active-learning strategy enhanced students' perceptions of their abilities to empathize with and counsel patients with multiple chronic disease states. SOAP notes confirmed student knowledge of chronic disease states and inclusion of pertinent and patient-specific counseling points. Overall, the chronic disease state simulation provided a novel approach to developing skills needed for working with complex patients encountered in direct patient care. This instructional technique may help prepare students for APPEs in ambulatory care and, ultimately, careers in ambulatory care settings.

REFERENCES

1. Wishah RA, Al-Khawaldeh OA, Albsoul AM. Impact of pharmaceutical care interventions on glycemic control and other health-related clinical outcomes in patients with type 2 diabetes: randomized controlled trial. *Diabetes Metab Syndr*. 2014;S1871-4021.
2. Stepien KA, Baernstein A. Educating for empathy. *J Gen Intern Med*. 2006;21(5):524-530.
3. Gleason BL, Peeters MJ, Resman-Targoff BH, et al. An active-learning strategies primer for achieving ability-based educational outcomes. *Am J Pharm Educ*. 2011;75(9):Article 186.
4. Meyers C, Jones T. *Promoting Active Learning; Strategies for the College Classroom*. San Francisco, CA: Jossey-Bass Inc.; 1993.
5. Chan ZC. Exploring creativity and critical thinking in traditional and innovative problem-based learning groups. *J Clin Nurs*. 2013; 22(15-16):2298-2307.
6. Braun KL, Cheang M, Shigeta D. Increasing knowledge, skills, and empathy among direct workers in elder care: a preliminary study of an active-learning model. *Gerontologist*. 2005;45(1):118-124.
7. Zeeni EA, Revago L, Ewart C, et al. A walk in the patients' shoes: a step towards competency development in systems based practice. *Ambul Pediatr*. 2006;6(1):54-57.
8. Dang D, Chen J, Lee J, et al. "Living" the Life of a Diabetic – Impact of Patient Simulations in a Didactic Course." *Paper presented at the annual meeting of the American Association of Colleges of Pharmacy*. Sheraton San Diego Hotel & Marina, San Diego, California, Jul 05, 2006.
9. Delea D, Shrader S, Phillips C. A week-long diabetes simulation for pharmacy students. *Am J Pharm Educ*. 2010;74(7):Article 130.
10. Westberg SM, Bumgardner MA, Brown MC, et al. Impact of an elective diabetes course on student pharmacists' skills and attitudes. *Am J Pharm Educ*. 2010;74(3):Article 49.
11. Whitley H. Active-learning diabetes simulation in an advanced pharmacy experience to develop patient empathy. *Am J Pharm Educ*. 2012;76(10):Article 203.
12. Medina MS, Plaza CM, Stowe CD, et al. Center for the Advancement of Pharmacy Education (CAPE) Educational Outcomes 2013. *Am J Pharm Educ*. 2013 Oct 14;77(8):Article 162.
13. Accreditation Counsel for Pharmacy Education. Accreditation Standards and Key Elements for The Professional Program in Pharmacy Leading to The Doctor of Pharmacy Degree. Standards 2016. Released 2/3/2014. Available at <https://www.acpe.accredit.org/pdf/Standards2016FINAL.pdf>. Accessed March 16, 2015.