

INSTRUCTIONAL DESIGN AND ASSESSMENT

A Post-Clerkship Pharmacotherapy Course

Kristin Wiisanen Weitzel, PharmD,^a John Gums, PharmD,^{a,b} Billie Nguyen, PharmD,^a and Christopher Terpening, PharmD, PhD^c

^aDepartment of Pharmacy Practice University of Florida

^bCommunity Health and Family Medicine, University of Florida

^cDepartment of Clinical Pharmacy, West Virginia University

Objective. A required 8-week, 2-credit hour, postclerkship pharmacotherapy course was incorporated into the Doctor of Pharmacy curriculum in the spring of 2001. This article reviews the implementation and evaluation of this pharmacotherapy course in its first 3 years.

Methods. Presurvey and postsurvey instruments were administered to the students, assessing their attitudes about the class and its application to their ability to practice as a pharmacist. Students also completed standard course and instructor evaluations, and a written evaluation was administered at the end of the course to further identify students' perceived strengths and weaknesses of the class.

Results. One hundred students completed the course the first year, with a mean final score of 94%. The majority of students agreed or strongly agreed that the course would provide them with the opportunity to demonstrate clinical and therapeutic knowledge and presentation skills, and the ability to answer faculty and student questions. Twenty percent of students agreed or strongly agreed that it would be useful to return to campus for didactic classes after completing clerkships, while 39% of students were neutral and 41% felt that it would not be useful.

Conclusion. This course was well received by students and faculty. Feedback from surveys and student evaluations continues to shape the direction and format of the course.

Keywords: pharmacotherapy, curriculum, doctor of pharmacy

INTRODUCTION

Pharmacy education is changing rapidly to meet the needs of a dynamic profession. Many teaching innovations have focused on preparing pharmacy students to transition from the traditionally passive learning environment of didactic coursework to the active learning environment of experiential training.^{1,2} The pharmacotherapy curriculum in our college is structured to do this, focusing on case-based learning throughout the curriculum, with the last 2 pharmacotherapy courses being entirely case-based to encourage an active learning process. Recent restructuring of the curriculum brought about major changes in the timeline of experiential training. Beginning with the class graduating in 2001, students enter clerkship training in March of the

third year, and complete clerkships 1 year later. The students are responsible for completing required coursework and may choose from a list of electives the 2 months prior to graduation. This article describes the implementation and evaluation of a required 8-week pharmacotherapy course offered after students have completed experiential training. Data from student surveys and course evaluations also are presented.

Didactic pharmacotherapy training begins in the first year of the pharmacy curriculum. Pharmacotherapy I through III comprise 12 semester hours and offer therapeutic training that is coordinated with the simultaneous teaching of drugs and disease states in Pharmacology and Medicinal Chemistry. Lectures are case based, and weekly small group discussions are conducted in a problem-based learning format. Pharmacotherapy IV and V span 16 and 8 weeks, respectively, and conclude at the start of advanced experiential training in the third year. These courses incorporate knowledge gained in all prior coursework and are structured entirely in a case-based format. A description of these

Corresponding Author: Kristin Wiisanen Weitzel, PharmD. Mailing Address: Department of Pharmacy Practice, University of Florida, P.O. Box 100486, Gainesville, Florida, 32610-0486. Tel: 352-273-6232. Fax: 352-273-6242. E-mail: weitzel@cop.ufl.edu.

courses has been published,³ although the courses have been developed further since the publication. Pharmacotherapy VI takes place 1 year after completion of Pharmacotherapy V, upon students' return from 1 year of advanced experiential training. Students return to Gainesville from locations throughout Florida to complete these 8 weeks of coursework and electives. Students are responsible for making their own housing arrangements during this time.

METHODS

Pharmacotherapy VI emphasizes the implementation of the professional concepts of pharmaceutical care. This 2-credit hour course is a student-centered learning, performance-based course in which students have the opportunity to display pharmaceutical care knowledge and problem-solving skills gained in Pharmacotherapy I through V and through advanced experiential training. Students are able to communicate their knowledge base in this course through presentation of patient cases to faculty and peers. Additionally, by attending their peers' presentations, students have the opportunity to compose and answer questions, and in the process, improve their knowledge base and critical thinking skills. This class is intended to help students improve their clinical knowledge, problem-solving skills, presentation skills, communication skills, team dynamics skills, and self- and peer-evaluation skills.

The goals of the course are for students to display competencies they have learned throughout didactic and experiential training to demonstrate that they are able to critically analyze the medical literature, apply medical evidence to an individual patient, and clearly communicate their recommendations to their peers. Students demonstrate that they can:

1. Locate, research, and present a clinical case in the topic area assigned from their clerkship experience.
2. Use the medical literature to determine and support their assessment of the patient and the patient's drug therapy.
3. Display drug and disease state knowledge, application of pharmaceutical care principles, and critical thinking through presentation of a patient case and question and answer session.
4. Display effective communication skills through presentation and question-and-answer sessions.
5. Display individual and autonomous analysis of each case through in-class participation.

In meeting these objectives, students are expected to:

1. Use the medical literature, appropriate medical reference texts, and the Internet to research an assigned topic for case presentation, research questions, and support a drug therapy plan for a particular patient.
2. Consult with their preceptor for interesting cases.
3. Present concisely.
4. Ask questions of others' presentations that are thought provoking and pertinent.
5. Answer questions appropriately and effectively.

Course Process/Classroom Activities

Students were oriented to the course and assigned topics with instructions before beginning their clerkships. During the 2001 offering of the course, the class of 100 was divided into 50 groups of 2 students. Each group was assigned a presentation and question topic. Topics were selected to focus on what were expected to be the most commonly encountered disease states during clerkships. Twenty-five generalist topics (eg, hypertension, upper respiratory infection, osteoporosis) were selected and thought to be broad enough to ensure that students would encounter them on rotations, so each topic was presented twice in the course. Students were contacted via email approximately 1 month before class began to ensure appropriate progress on presentations and to answer any questions.

The course met twice weekly for 2 hours at each meeting. The first class meeting was used for orientation and questions. Every subsequent class was divided into four 25-minute presentation sessions. During the 25-minute presentation, students were allotted 10 minutes to present a patient case from their clerkships and justify their treatment recommendations, 5 minutes for the question team assigned that topic to ask the presenters their questions, and 10 minutes for faculty members to ask questions and for presenters to provide a verbal defense of their clinical recommendations and actions. All College of Pharmacy faculty and Gainesville area clerkship faculty members were invited to attend presentations. Students were notified of their presentation dates 2 to 4 days in advance. Weekly quizzes were administered in the evenings using WebCT (WebCT, Inc., Lynnfield, Massachusetts, Version 3.0, November 2000) an Internet-based teaching and assessment tool that covered topics and issues raised in the preceding 2 classes.

Assessment

Students were evaluated on a pass/fail basis, with a score of 80% or higher representing a passing grade. Students who did not receive a passing grade in this course were required to repeat it the next year, delaying their graduation by 1 year. The presentation grade comprised 55% of the total grade. The 3 faculty members who taught the courses evaluated each team's presentation and question skills. Presentation team evaluations were based on the completeness of the handout, inclusion of appropriate discussion of disease state(s), drug therapy, critique of therapy and alternative treatments, ability of the presenters to answer questions, presentation skills, satisfaction of time requirements, and appropriate referencing and research of the data. Proficiency in asking questions comprised 15% of the grade and was evaluated according to the team's ability to ask relevant and intelligent questions that pertained to the topic and were appropriate in breadth and depth. Teams were also required to provide answers to unanswered questions and to correct incorrect answers. Presentation team and question team evaluation criteria are presented in Appendix 1. Students were provided with the presentation team and question team evaluation instruments prior to the start of class. After students presented, they received a summary sheet with the average of the 3 faculty evaluators' scores for each section of the grading instrument and a summary sheet of the instructors' written comments for feedback purposes. The same 3 faculty members assessed each student throughout the majority of the course to maintain consistency.

The remaining 30% of the student's grade was based on attendance and WebCT quizzes. The attendance policy stated that missing 5 or more classes, regardless of the reason, resulted in a 5% reduction in the student's grade. Greater than 10 absences resulted in a grade of "incomplete" and the student was required to repeat the course.

Survey and Evaluation

In addition to standardized course evaluations, students completed presurvey and postsurvey instruments assessing their attitudes about the class and its application to their ability to practice as a pharmacist. The presurvey instrument was administered prior to the start of the course, and the postsurvey instrument was given at the end of course. Both survey instruments were administered via WebCT. The presurvey instrument consisted of 15 questions (Appendix 2). The postsurvey instrument also consisted of 15 questions,

each of which was matched to a presurvey question. The *Wilcoxon Matched Pairs Test* was used to compare presurvey and postsurvey results. Students also completed standard course and instructor evaluations and a written evaluation at the end of the course to further identify student-perceived strengths and weaknesses of the course. These course and written evaluations were completed anonymously in class and distributed and collected by student class representatives.

RESULTS

One hundred students completed the course in the first year. All students received a passing grade in the course, with a mean score of 94%. Of these 100 students, approximately 60% were required to move back to Gainesville to complete this portion of the curriculum. All students met the attendance requirements of the course, with 7 students missing only 1 class, 4 students missing 2 classes, and the remaining 89 attending all classes.

Presurvey and Postsurvey

The results of the presurvey and postsurvey are presented in Table 1. Before completing the course, 91% to 93% of students agreed or strongly agreed that the course would provide them with the opportunity to demonstrate clinical and therapeutic knowledge and presentation skills, and the ability to answer faculty and student questions. Seventy-three percent to 76% of students anticipated that they would do a good job demonstrating their clinical and therapeutic knowledge, presentation skills, and their ability to answer faculty and students' questions about their presentations. By preparing for and participating in the course, 78% and 88% of students, respectively, anticipated that they would gain valuable therapeutic knowledge and learn new pharmacotherapy content. Before completing the course, 75% of students agreed or strongly agreed that they were confident in their ability to practice successfully as a clinical pharmacist at that point in their education, while almost 37% of these students felt neutral about whether the class would help them in their future practice. The students' responses varied on their opinions of the value of returning to campus for didactic classes after completing their clinical rotations, with 20% agreeing or strongly agreeing that it would be useful, 39% remaining neutral, and 41% feeling that it would not be useful. There was no significant difference in between the students' responses to any of the survey questions before the course and the student's response after completing the course.

Table 1. Results of a Presurvey and Postsurvey* of Students Enrolled in a Post-Clerkship Pharmacotherapy Course

Question	Presurvey Mean (SD) [†] n = 77	Postsurvey Mean (SD) n = 75
1. I will be provided the opportunity to demonstrate my clinical and therapeutic knowledge in this class.	1.73 (0.82)	1.84 (0.70)
2. I will be provided the opportunity to demonstrate my presentation skills in this class.	1.58 (0.80)	1.55 (0.72)
3. I will be given the chance to demonstrate that I can answer faculty and students questions about my case presentation.	1.70 (0.71)	1.77 (0.88)
4. I anticipate that I will learn new pharmacotherapy content in the process of compiling the case and supporting materials for this class.	1.73 (0.90)	1.88 (0.76)
5. Returning to campus after clinical rotations for this class is worthwhile.	3.31 (1.09)	3.08 (1.27)
6. I expect to gain valuable therapeutic knowledge during this class by listening to other students' case presentations.	2.13 (0.89)	2.28 (0.90)
7. I expect to improve my presentation skills during this class.	2.53 (0.99)	2.68 (0.98)
8. I think that I will do a good job in demonstrating my clinical and therapeutic knowledge in this class.	2.22 (0.81)	2.04 (0.69)
9. I think that I will do a good job in demonstrating my presentation skills in this class.	2.09 (0.76)	2.08 (0.75)
10. I think that I will do a good job in demonstrating that I can answer faculty and students' questions about my presentation.	2.18 (0.76)	2.21 (0.78)
11. I feel confident that I can practice successfully as a clinical pharmacist at this point in my education.	2.13 (0.91)	2.04 (0.77)
12. This class will help me in my future practice.	2.47 (0.91)	2.57 (0.97)
13. This class will provide me with a chance to prove what I have learned in my clinical rotations.	2.58 (1.02)	2.47 (1.04)
14. This class will be a great confidence builder by proving to myself that I do know a lot about patient care and drug therapy.	2.71 (0.97)	2.56 (0.95)
15. The experience of asking questions of others' case presentations will help me in formulating therapeutic recommendations of my own.	2.42 (0.90)	2.66 (0.91)

*P > 0.05 for all presurvey and postsurvey comparisons

[†]SD = Standard Deviation

Key: 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, 5 = strongly disagree

Evaluations

Student evaluations of their instructors for this course were positive. Based on general feedback and course evaluations, students seemed pleased overall with the content and structure of the course. To assist with future development of the course and to gather additional information, students were administered an additional evaluation on the last day of class that assessed which components of the course were most useful to learning and what they would most like to

change about the course. This follow-up assessment differentiated between students who had to return to Gainesville and those who already resided in Gainesville prior to the last 8 weeks of the curriculum. Regarding what was most useful in the course, students were presented with a series of items that included preparing and conducting presentations, asking and answering questions, listening to presentations and question sessions, and taking quizzes. Of 56 responses, 63% and 18% of students felt that preparing for or

conducting presentations, respectively, was the most useful to them. Students were also asked which component of the course they would most like to change, with possible responses including decreasing repetition of therapeutic topics, knowing in advance when they were scheduled to present, eliminating or expanding the student question section, eliminating quizzes, or expanding presentation time. Of the 54 responses to this question, 31% of students would have liked to eliminate the repetition of therapeutic topics, and 31% would have known in advance when each team was scheduled to present. Students who had to return to Gainesville to complete this portion of the curriculum were asked their opinions about this requirement. Fifty-two percent of the students felt that the class was worthwhile, even though they had to return to Gainesville after rotations, while 35% of students responded that it would have been worthwhile if they had already been in Gainesville during this time.

DISCUSSION

The course coordinators felt that this course format was overall a success based on the flow of the course, in-class activities and discussion, anecdotal student feedback and evaluations. As assessed by the presurvey and postsurvey instruments, students felt positive about their opportunities to learn, demonstrate, and improve the skills they had learned on clinical clerkships; however, many had reservations before and after completing the course about its usefulness in their practice and the concept of returning to Gainesville for didactic coursework following clinical rotations. It is important to note though, that upon questioning the group of students who had to return to Gainesville for this portion of the curriculum, over half felt that the class was worthwhile even though they had to return to Gainesville after rotations.

As with many course coordination experiences, the most useful information about problematic issues and positive aspects of the course was gained through the actual course process and spending time with students to find out what was on their minds. Unexpected problems that arose included the possibility of academic dishonesty with the use of the Web-based quiz format, difficulty in encouraging and tracking student attendance, and the rigid time schedule required in the course due to the large number of presentations over sixteen class meetings. Students also had difficulty accessing other groups' PowerPoint slides prior to class due to limitations of the WebCT system. Positive aspects of the course included witnessing the increase in the level of professionalism and knowledge in students that have been in a clinical practice environment for 12

months, and the students' interest in participating in others' presentations. Many pharmacy practice faculty attended the course to ask questions and participate and commented that it was rewarding to see how well the students performed in both presenting and asking well thought out questions.

Upon writing this article, this course has been administered 2 additional years, in Spring 2002 and 2003. Changes were made to the course in 2002 based on class size changes, student feedback, evaluations and instructor observations from Spring 2001. In the second year, the quiz format remained the same, but written quizzes were administered in class, rather than using the Web-based format. The class Website was also administered using Blackboard instead of WebCT. For our purposes, this system allowed students to easily post presentations and handouts for others to access and was simple to administer. The absence policy was also changed to allow for fewer absences before penalizing students. Due to an increase in class size from 100 students to approximately 125 in this year, the number of presentation groups increased to 62, so topics were also expanded accordingly, although there was still duplication of some presentation topics. Also because of the increased number of presentations, time for student and faculty questions was limited to five minutes each.

In 2003, the course was administered much the same as 2002, with only one significant administrative change. Due to time constraints in class, weekly quizzes were given in the evenings using BlackBoard. An additional trend that has been observed by course faculty over the last three years, though, involves the content of students' presentation. Both presentations and questions have become increasingly case-based and patient centered over this time. A significant amount of time was devoted during orientation and throughout the years of 2002-2003 to mentor the students through the process of case presentation and the use of evidence based medicine to support their therapeutic recommendations. As a result, we have seen the complexity of the cases, presentations, therapeutic recommendations, and questions increase. We feel this has benefited the students by encouraging them to present patients at an advanced level and has also decreased repetition in the course since no two patients are alike.

As with other courses, we will continue to seek feedback to ensure that the course is able to meet the needs of this unique portion of the curriculum and the advanced level of the students.

REFERENCES

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Appendix 1. Presentation Team Evaluation Items

Please use the following scale for all evaluations:

- 5 4 3 2 1
 (strongly agree) (agree) (neutral) (disagree) (strongly disagree)

1. The presentation included an appropriate discussion of the disease state(s).
Comments:
2. The presentation included an appropriate discussion of the drug therapy.
Comments:
3. The presentation included an appropriate critique of the therapy and a discussion of alternative treatments specific to the patient.
Comments:
4. The presentation was clear.
5. The presentation was well researched and appropriately referenced.
6. The presentation was delivered in the allotted time.
7. The presenter demonstrated professional presentation skills (eye contact, vocal inflection, posture, gesturing).
8. The presenter answered all questions appropriately.
9. The handout included all of the following elements: Demographic Data, CC, HPI, PMH, SH, FH, Medications, Allergies, Pertinent PE and Lab Data, Assessment, Plan, and Patient Education.
10. The handout was no more than 2 pages in length.

<i>SCORE</i>	
TOTAL SCORE:	/50
PERCENT SCORE:	

Please use the following scale for all evaluations:

- 5 4 3 2 1
 (strongly agree) (agree) (neutral) (disagree) (strongly disagree)

1. The questioner was prepared to ask relevant and intelligent questions pertaining to the topic.
Comments:
2. Questions were appropriate in breadth and depth.
Comments:
3. The questioner provided correct answers to unanswered questions.
Comments:

<i>SCORE</i>	
TOTAL SCORE:	/15
PERCENT SCORE:	

Appendix 2. Presurvey Instrument

Question	Response	Rating Scale
1. I will be provided the opportunity to demonstrate my clinical and therapeutic knowledge in this class.	1 2 3 4 5	
2. I will be provided the opportunity to demonstrate my presentation skills in this class.	1 2 3 4 5	
3. I will be given the chance to demonstrate that I can answer faculty and students questions about my case presentation.	1 2 3 4 5	
4. I anticipate that I will learn some new pharmacotherapy content in the process of compiling the case and supporting materials for this class.	1 2 3 4 5	
5. Returning to campus after clinical rotations for this class is worthwhile.	1 2 3 4 5	
6. I expect to gain valuable therapeutic knowledge during this class by listening to other students' case presentations.	1 2 3 4 5	
7. I expect to improve my presentation skills during this class.	1 2 3 4 5	
8. I think that I will do a good job in demonstrating my clinical and therapeutic knowledge in this class.	1 2 3 4 5	
9. I think that I will do a good job in demonstrating my presentation skills in this class.	1 2 3 4 5	
10. I think that I will do a good job in demonstrating that I can answer faculty and students' questions about my presentation.	1 2 3 4 5	
11. I feel confident that I can practice successfully as a clinical pharmacist at this point in my education (even BEFORE taking this course).	1 2 3 4 5	
12. This class will help me in my future practice.	1 2 3 4 5	
13. This class will provide me with a chance to prove what I have learned in my clinical rotations.	1 2 3 4 5	
14. This class will be a great confidence builder by proving to myself that I do know a lot about patient care and drug therapy.	1 2 3 4 5	
15. The experience of asking questions of others' case presentations will help me in formulating therapeutic recommendations of my own.	1 2 3 4 5	

Rating scale: 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree, 5 = strongly disagree