

Descriptive Evaluation of a New Critical Care Elective Course

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ABSTRACT. The objective of this manuscript is to describe an experience with a critical care elective course for third professional year pharmacy students. Fifteen students were enrolled in the course. The class was provided with pre-session readings and met once weekly to debate and discuss the pharmacologic and pharmacotherapeutic implications of common therapies utilized in the critically ill. Students were given a course evaluation at the end of the semester. The evaluation asked the students their opinion of the pre-session readings, their perception of the course as part of the core pharmacy curriculum, and how the course affected their future career plans. The students valued the opportunity to read and discuss primary literature and complex topics. Their experience may have motivated some to consider additional experiences in critical care. The course provided a more focused experience for students inter-

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The authors like to thank everyone at the College of Pharmacy faculty who directly participated in the concept and implementation of this course including Jimmi Hatton, Barbara Magnuson, Craig Martin, Ken Record, Bonnie Rosbolt, and P. Shane Winstead, as well as our critical care pharmacy residents Emily Sterling and Kyle Weant. A special thanks is also extended to Barbara Brandt for her willingness to share her time, experience, and expertise.

Journal of Pharmacy Teaching, Vol. 13(1) 2006
Available online at <http://www.haworthpress.com/web/JPT>
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doi:10.1300/J060v13n01_05

ested in the area of critical care pharmacy practice than they might have otherwise received from the core pharmacy curriculum. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2006 by The Haworth Press, Inc. All rights reserved.]

KEYWORDS. Critical care, elective course, pharmacy

INTRODUCTION

The intensity and complexity of care provided in intensive care units continues to increase as new treatment modalities and devices are developed. As a result, the role of the pharmacist in the care of critically ill individuals has become increasingly significant over the last 20 to 30 years. Several publications have described the advantages of having a pharmacist with specialized knowledge in intensive care (1-3). Pharmacists in the intensive care unit commonly provide evidence-based recommendations regarding common therapies in critically ill individuals such as sedative agents, antimicrobial agents, and nutrition support. Pharmacists in the intensive care setting may participate in medical emergencies, provide pharmacokinetic monitoring of target medications such as vancomycin and anticonvulsants, educate other healthcare professionals, and implement guidelines and standardization of care. Such activities have been associated with both decreased costs and improved patient outcomes (1). A summary of the importance of the pharmacist as a member of the multi-disciplinary intensive care team was recently highlighted in a position paper jointly sponsored by the American College of Clinical Pharmacy and the Society of Critical Care Medicine (2). Pharmacist involvement in the care of critically ill individuals is evolving from a luxury to a necessity (3).

Critical care is a relatively small, but emerging niche in institutional pharmacy practice compared to other more common career paths such as community practice. As a result, it is natural for today's pharmacy curricula to focus primarily on issues and topics that will best prepare graduates to function in the most typical practice areas. However, this may lead to a minimal or complete lack of exposure of students to critical care pharmacy practice. This is of particular detriment to the specialty of critical care pharmacy because this avenue of practice often requires specialized training and appears to be an area of growth within the profession of pharmacy, both in the last 15 to 20 years and in the future (4, 5).

The University of Kentucky College of Pharmacy has a long history of critical care faculty, both based in academia and clinical practice. However, they were typically not able to fully introduce students to this pharmacy specialty during the didactic portion of their education. The majority of the pharmacotherapy information presented to pharmacy students occurs in the third professional year of the curriculum by way of an integrated pharmacotherapy and pathology course. A one week critical care module was recently added to this course and consists primarily of a superficial description of the various roles a pharmacist may have in different intensive care unit settings and a brief overview of the common types of patients and disease states encountered. For example, the cardiothoracic surgery pharmacy specialist describes his role in aiding in the management of post-operative arrhythmias, while the neurosurgery pharmacy specialist discusses the pharmacist's role in manipulating intracranial and cerebral perfusion pressure in patients with brain injury. Other critical care topics such as reviews of emergency response, treatment of nosocomial infections, treatment of venous thromboembolism, management of gastrointestinal bleeding, and nutrition support are contained in other modules throughout this course and other concomitant courses.

Given the documented impact of clinical pharmacists on the care of the critically ill, and the relative lack of critical care in our pharmacy curriculum, it was hypothesized that further exposure to this area of practice for interested students could have substantial impact on their overall pharmacy education experience and their selections for clinical exposure in their future. Thus, an elective course was developed.

THE COURSE

The University of Kentucky College of Pharmacy curriculum is composed of three professional years of didactic classroom work and a fourth year of advanced practice experiences. The initial plan was to allow up to twelve students to enroll during the Spring semester of the third professional year. This timing assures that students have been exposed to the majority of pharmacotherapy topics, including a brief critical care primer, which allows for the presentation of more sophisticated material in the critical care elective. The critical care elective course was designed to facilitate discussion and active learning within a small classroom setting. Ultimately, fifteen students enrolled (including one student in the fourth professional year) due to high interest in the course. The two credit hour

class was scheduled to meet for two hour sessions once weekly throughout the semester. The web-based platform Blackboard® was utilized to provide students with the course syllabus and objectives, up-to-date course calendar, announcements, and weekly pre-session readings.

Four primary objectives served as the foundation for topic discussions. First, students should be able to explain the physiologic processes that contribute to critical illness. Common conditions that may cause or may occur due to specific acute critical illness were also discussed. Students should also be able to explain the rationale supporting common therapeutic strategies employed in critical care. Lastly, they should be capable of evaluating primary literature related to the pharmacotherapy of critically ill patients. Third professional year students in our curriculum have acquired the knowledge and skills to achieve each of these objectives and were thus targeted as the participants in the course.

A variety of common disease states were included in the course and practitioners from each specialty area were invited to present corresponding topics (Table 1). The selection of subjects tended to be reflective of the basic information that a practitioner would need to be aware of when caring for critically ill individuals. The sessions were designed to provide a greater depth of information on topics to which the students were exposed in the core pharmacy curriculum and also to incorporate contemporary issues at the forefront of intensive care practice. Also, the core topics were those, which the faculty and curriculum committee

TABLE 1. Discussion Topics

	Topic
Week 1	Course Introduction and syllabus review
Week 2	Anemia of critical illness and transfusion practice
Week 3	Endocrine issues in the critically ill
Week 4	Basics of cardiovascular hemodynamics
Week 5	Sedation, analgesia, and neuromuscular blockade guideline review
Week 6	Basic management of acute stroke
Week 7	Management of traumatic brain injury
Week 8	Acute renal failure and how to read a nursing flow sheet ("Field trip")
Week 9	Cardiac surgery primer
Week 10	Specialty populations in nutrition support
Week 11	Current issues in the treatment of nosocomial pneumonia
Week 12	Surviving sepsis

have determined to be the minimal information in this area that is needed by a generalist pharmacist. Students were expected to complete two to three assigned readings prior to each session, which were typically a mixture of landmark studies defining the current practice for the “topic of the day,” recent review articles describing the topic, and textbook chapters (Appendix 1). Each session consisted of an interactive discussion between the students and faculty. All students were engaged in the discussion to affirm their comprehension of the readings and re-enforce the material discussed. Most often, the discussions were initiated by a short lecture from the faculty, based on the assigned readings. Faculty also used specific examples from clinical practice (i.e., de-identified patients currently in the hospital) to illustrate the most important points and to emphasize the realistic application of evidence-based medicine. A weekly post-session quiz was administered via Blackboard® to reinforce the main points of the discussion.

Grades for the course consisted of three factors. Students were graded based on their attendance and participation in classroom discussions as defined by the faculty facilitating the discussion. Post-session quizzes were posted on Blackboard® after each session. The questions for each quiz were developed by the faculty facilitating the discussion or by a course coordinator in attendance. For each session, two to four multiple choice or multiple answer questions based on a patient case scenario were assigned to reinforce the key points for each topic. Students completed the open-book quizzes on their own time during the week following each session. Although no cumulative assessment was given, the session regarding sepsis at the end of the course incorporated nearly all of the topics discussed through the semester.

Following the last session of the course, students were asked to complete an anonymous evaluation posted on Blackboard®. The evaluation was intended to assess students’ satisfaction with the course and to determine if the course affected their future career plans, both in upcoming clerkship experiences and beyond.

RESULTS OF COURSE EVALUATIONS

All fifteen students completed the course evaluation instrument within a week of the last session and prior to the posting of the final grades. The results of the evaluations were quite positive and provided constructive feedback that will allow the critical care elective course to continue to evolve (Table 2). In general, the students felt that the pre-session readings

TABLE 2. Evaluation Results*

Question	Mean Score (\pm SD)
1. Blackboard is the best way to distribute information and readings for this type of course.	4.1 (1.0)
2. The pre-session readings were reflective of our discussion in class.	4.5 (0.5)
3. The pre-session readings were supplied in a timely manner.	3.7 (1.0)
4. Completing the reading assignments did not encroach upon the time I needed to study for my other pharmacy school classes.	3.8 (0.7)
5. Reading the primary literature (research articles) provided before some of the sessions enhanced my understanding of the topic.	4.5 (0.8)
6. Reading the review articles and book chapters provided before some of the sessions enhanced my understanding of the topic.	4.4 (0.6)
7. I learned new pharmacotherapy content and principles as a result of the readings and class discussions.	4.8 (0.4)
8. The questions from the quizzes were reflective of what was discussed in class and what was included in the readings.	4.8 (0.6)
9. The topics covered in this course were the same as was covered in the concurrent Therapeutics course.	2.7 (1.2)
10. The topics covered in this course were more in-depth than was covered in the concurrent Therapeutics course.	4.9 (0.4)
11. This course was primarily for students who want to practice in a hospital or do a residency.	3.6 (1.1)
12. The "field trip" day to the ICU to review the nursing flow sheet and discuss a real ICU patient enhanced my understanding of the type of patient one sees in an ICU.	4.4 (0.8)
13. The "field trip" day to the ICU made me more comfortable/excited for my upcoming clerkship experiences.	3.9 (1.1)
14. I am more interested/excited about incorporating clinical activities in my future pharmacy practice as a result of this course.	4.9 (0.3)
15. This course affected how I chose my PY4 clerkship experiences.	4.2 (0.8)
16. I would recommend this elective course to other pharmacy students.	4.7 (0.5)
17. I plan to pursue post-graduate pharmacy training (e.g., residency, fellowship).	3.6 (0.8)
18. I felt comfortable with what I needed to do to succeed in this class.	4.7 (0.5)
19. The faculty were available for questions outside of class.	4.6 (0.5)
20. The timing of this course within the pharmacy curriculum (Spring, 3 rd year of pharmacy curriculum) is prudent.	4.3 (0.6)

*Based on a 5 point scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree).

added to their understanding of the topic and did not adversely affect the time they spent on other course work within the core pharmacy curriculum. The evaluations included narrative comments such as "often times in other courses we are cited information and told guidelines, but the review of primary literature and open-interactive lecture style has greatly

increased my knowledge and comfort level with critical care situations” and “as students we have done some article searching and become familiar with the statistics of research projects, but done little review of the important articles.” The feedback with regard to pre-session assignments is encouraging because many of the readings were primary literature and technically difficult to analyze for students with only basic literature evaluation skills. This is probably best summarized by one of the students, who wrote, “Sometimes the articles were a little over my head . . . but that is the point, I think. I wanted to be stretched a little!”

The selection of subject matter discussed during each session was essential for providing the students a basic exposure of realistic critical care practice and providing an engaging and interesting dialogue. The topics selected for discussion were also timed such that many would correspond to the material presented in the core pharmacy curriculum. In several instances, the critical care topic coincided with general information provided in the Integrated Therapeutics course during the same week. This coordination was particularly impactful for the students as reflected in their evaluation comments: “we learned some of the ‘what to do’s’ in Therapeutics, but this class gave us the ‘why’s.’” As a result, students felt they gained a considerable amount of new information from the course as well as insight as to how to apply the information they had previously obtained in the core curriculum.

Perhaps the most significant aspect of the students’ experience was the effect the course and the material had on students’ future plans. The students identified that the clerkships they selected for their advanced pharmacy practice experiences in the fourth and final year of the pharmacy curriculum were affected by their participation in this course. In fact, a review of the clerkship schedule at the beginning of their experiential year revealed that students from this course were 3 times more likely to select an intensive care unit clerkship than students that did not take this course (1.3 ICU clerkships per elective course student vs. 0.4 ICU clerkships per non-elective course student). Although these students may have selected rotations due to other factors such as location, time of year, etc. and they expressed their interest in critical care by enrolling in the course and were thus more likely to select critical care clerkships, the results of the evaluation also suggest that participation in the course may have been a factor that affected clerkship selection as well (Table 2, question 15).

Participation in the course may have left students more eager to integrate acute care clinical activities into their future experiences both on clerkships and in their chosen careers. An in-class survey of students at

the beginning of the course revealed that approximately 66% of the class planned to engage in community/retail practice after graduation. However, according to the evaluation at the completion of the course, the number of students considering post-graduate education such as a pharmacy practice residency increased (53% of students). The course may have motivated the students by displaying the value of a pharmacist's contributions in a specific acute care environment.

DISCUSSION

Several factors should be considered by schools and colleges desiring to implement a similar course. Our critical care group has several characteristics that may have contributed to this course's success. The critical care faculty is a ten member group and has long been active in teaching and clinical practice. As a result, there were a number of faculty who were able to contribute to the structure of the class and facilitating the sessions. Critical care pharmacy residents were also able to participate as instructors in the course. The mix of different areas of expertise, experience, and availability made feasible the scheduling of a variety of topics. Also, the short critical care module in the Integrated Pharmacotherapy and Pathology course occurred during and immediately after class registration for the critical care elective. The proximity of these lectures to the introduction of this course may have positively influenced the interest level of the students in intensive care.

As this was the initial experience for the critical care elective course, multiple areas for improvement were noted. First, a formal, comprehensive pre-course assessment will be incorporated to identify baseline attitudes and feelings towards critical care topics and plans for future career direction. This should aid the course coordinators to better focus the topics covered and the type of instruction needed to best facilitate discussion and learning. Second, more frequent use of realistic patient scenarios may be beneficial. The students remarked that the use of case studies and real-life examples was particularly helpful in illustrating important points in each discussion. The fact that all of our instructors in this course are also clinical practitioners should make supplementing the discussion with more realistic case-based activities relatively simple. Finally, although the students completed the pre-session reading assignments and were able to demonstrate comprehension of a great deal of often very complex topics, they were not asked to retrieve related lit-

erature on their own. Efficient literature retrieval is an important skill to master. Identifying and accessing pertinent primary literature will be incorporated into future courses. Future plans also include consideration of an additional post-clerkship survey, which may help to further clarify the possible effects of the course experience on clerkship selection and post-graduate career direction.

CONCLUSION

The intensity and complexity of care provided in most intensive care units continues to increase as new medications, treatment strategies, and devices are developed. The role of clinical pharmacists in providing pharmacotherapy guidance in the critical care environment is likely to continue in its transition from a luxury to an imperative (3). Colleges of Pharmacy should seek to expose students to this important area of practice within their core curriculum or in alternative experiences, such as small, focused elective courses. In our College of Pharmacy, this course supplemented the core curriculum pharmacotherapy teachings and affected the outlook and, perhaps, the plans of the students enrolled.

Received: November 16, 2005

Reviewed: January 13, 2006

Revised: February 23, 2006

Reviewed and Accepted: February 24, 2006

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APPENDIX 1

COURSE READING LIST

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