

INSTRUCTIONAL DESIGN AND ASSESSMENT

A Required Course in the Development, Implementation, and Evaluation of Clinical Pharmacy Services

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Objective. To develop, implement, and assess a required pharmacy practice course to prepare pharmacy students to develop, implement, and evaluate clinical pharmacy services using a business plan model.

Design. Course content centered around the process of business planning and pharmacoeconomic evaluations. Selected business planning topics included literature evaluation, mission statement development, market evaluation, policy and procedure development, and marketing strategy. Selected pharmacoeconomic topics included cost-minimization analysis, cost-benefit analysis, cost-effectiveness analysis, cost-utility analysis, and health-related quality of life (HRQoL). Assessment methods included objective examinations, student participation, performance on a group project, and peer evaluation.

Assessment. One hundred fifty-three students were enrolled in the course. The mean scores on the objective examinations (100 points per examination) ranged from 82 to 85 points, with 25%-35% of students in the class scoring over 90, and 40%-50% of students scoring from 80 to 89. The mean scores on the group project (200 points) and classroom participation (50 points) were 183.5 and 46.1, respectively. The mean score on the peer evaluation was 30.8, with scores ranging from 27.5 to 31.7.

Conclusion. The course provided pharmacy students with the framework necessary to develop and implement evidence-based disease management programs and to assure efficient, cost-effective utilization of pertinent resources in the provision of patient care.

Keywords: clinical pharmacy services, pharmacoeconomics, business plan

INTRODUCTION

The vision for future practice of pharmacy has prompted a mandate for pharmacy educational revision, supported both by a large number of professional organizations and by the revised accreditation standards.¹⁻⁴ The goal of 3 faculty members—2 clinical and 1 pharmacy administration—at Duquesne University Mylan School of Pharmacy was to develop a course that taught doctor of pharmacy (PharmD) students how to design, implement, and evaluate clinical pharmacy services in an interactive learning environment. In addition, the faculty wanted to integrate the new educational competencies described in the accreditation standards and guidelines into the required pharmacy practice course. The course described in this article incorporates the ACPE Accreditation Standards and Guidelines for the Professional Program in Pharmacy under Standard No. 12: Professional Competencies and Outcome Expectations.⁵ Guideline

12.1 specifically describes the outcome expectations for the students completing this required course. Clinical faculty members devoted time to business planning with application to different practice settings where students learn to provide patient-centered care “through the ability to manage a successful patient-centered practice including establishing, marketing, and being compensated for medication therapy management and patient care services rendered.”⁵ Guideline 12.1 also requires that students are able to show the ability to deliver pharmaceutical care by learning about “population specific, evidence-based clinical service programs, developed upon analysis of epidemiologic and pharmacoeconomic data.” These topics are delivered in the classroom and students exhibit their mastery of the subject matter by writing a group business plan for a clinical service program. The completion of this business plan for a clinical service with pharmacoeconomic analysis meets the systems management outcome demonstrating the students’ ability to “ensure efficient, cost-effective use of human, physical, medical, informational, and technological resources.”

The rationale for the course was a perceived need by our faculty that future pharmacists working in a variety of

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practice settings will require education on how to take ideas for new program development and translate them into the real world of practice and financial accountability. The rationale was validated by pharmacists who attended continuing education programs on immunization theory and practice. They consistently expressed an interest for more course time devoted to developing and implementing an immunization practice into their own working environment.⁶ Students on advanced pharmacy practice experiences or in internships also reported that they were being asked to design and assist in implementing new pharmacy service programs.

The required course is part of a sequence of pharmacy practice courses. It is a 3-credit hour course entitled *Pharmacy Practice V: Clinical Pharmacy Services and Pharmacoeconomics* that was initially offered during fall semester 2006 to the third-year class of 153 students. This course is part of a series of courses beginning in the first semester of the first year. *Pharmacy Practice I* covers the concepts and philosophy associated with patient-centered care and pharmaceutical care. *Pharmacy Practice II* is a course dedicated to learning communication and interviewing skills and application of those skills to a real world self-selected patient. *Pharmacy Practice III* is the self-care course. *Pharmacy Practice IV* teaches physical assessment skills, screening techniques, interpretation of laboratory values, and principles of health promotion and disease prevention. This article will describe the design, methods of evaluation, and results of implementing *Pharmacy Practice V: Clinical Pharmacy Services and Pharmacoeconomics* so that other faculty members who are interested in curricular development in view of the new accreditation standards and expected new educational outcomes may benefit from our experiences.

DESIGN

The primary purpose of the course was to provide students with the knowledge and skills necessary to (1) develop a business plan (2) implement clinical pharmacy services in different practice settings and (3) evaluate the economic, clinical, and humanistic outcomes (ECHO) of the service. Selected course objectives included:

1. Describe the role of the mission statement in program planning, how to identify and evaluate a market and competitors of a clinical pharmacy service, and how to develop a marketing strategy for a clinical pharmacy service.
2. Identify pertinent clinical and quality requirements/standards of care for various ambulatory and health systems clinical pharmacy services.
3. Describe the parts of and how to write an effective business plan for a clinical pharmacy service.

4. Create a business plan for a hypothetical pharmacy service.
5. Discuss the application of pharmacoeconomic evaluations in clinical, hospital, and community practice, managed care organizations, and other practice settings.
6. Synthesize a plan to economically evaluate a hypothetical pharmacy service.

The course consisted of three 50-minute class periods per week. Selected lecture topics are shown in Table 1 in the order of presentation. The first 5 weeks of the course encompassed describing the parts of a business plan and how to develop a business plan for pharmacy services. The backbone of this first portion of the course was a thorough exploration of the business plan model developed by G. Schumock and its application to the development of different clinical services for various patient populations.⁷ The business planning portion of the course covered the process for literature evaluation, development of mission statements, evaluating the market and competitors, operations and processes, policies and procedures, SWOT (strengths, weaknesses, opportunities, threats) analysis, marketing strategy, and action plans and timelines. Additional topics discussed during this time period included clinical and quality requirements, standards of care, pharmacy compensation for clinical pharmacy services, and collaborative agreements. The second 5 weeks of the course focused on describing and discussing various clinical pharmacy services that have been implemented in a variety of practice settings. Selected services described included an anticoagulation monitoring program, a hospital decentralized pharmacy service, a critical care pharmacy service, an immunization service, a dyslipidemia management clinic, a diabetes self-management clinic, a long-term care infection control service, and a medication therapy management service. The last 5 weeks of the course concentrated on pharmacoeconomics and outcomes research. Selected topics included cost-minimization analysis, cost-benefit analysis, cost-effectiveness analysis, cost-utility analysis, and health-related quality of life (HRQoL). Lecture material, discussion, and examples in the pharmacoeconomic portion were directed toward clinical pharmacy services. The foundational principles of pharmacoeconomic analysis were tied together with the business plan model in an effort to provide full integration of topic areas and to demonstrate real world viability of a proposed service.

The 3 textbooks required for the course were *How to Develop a Business Plan for Clinical Pharmacy Services: A Guide for Managers and Clinicians*,⁷ *Handbook of Institutional Pharmacy Practice*, 4th edition,⁸

Table 1. Lecture Topics in Pharmacy Practice V: Clinical Pharmacy Services and Pharmacoeconomics

Business Planning

1. Exploring the business concept
2. Literature evaluation
3. Mission and mission statements
4. Evaluating the market and competitors
5. Clinical and quality requirements/Standards of care
6. Proposed operations and processes
7. Policies and procedures
8. Risks and opportunities
9. Compensation
10. Marketing strategy
11. Collaborative agreements
12. Credentialing and scope of practice
13. Action plan/Timeline
14. Writing the business plan

Clinical Pharmacy Services

1. Health-systems services
 - a. Antibiotic streamlining
 - b. Medication reconciliation
 - c. Medication adherence clinic
2. Ambulatory care services
 - a. CLIA and laboratory service requirements
 - b. Pharmacy-based immunization service
 - c. Lipid clinic
 - d. Diabetes clinic
 - e. Medication Therapy Management (MTM) service
3. Long-term care
 - a. Consultant practice
 - b. Infection control service
4. Indigent care services/Charitable pharmacies
5. Hospice and palliative care

Pharmacoeconomics and Outcomes Research

1. Data sources for economic analysis
 2. Partial economic evaluations: cost of illness and cost analysis
 3. Cost-minimization analysis
 4. Cost-benefit analysis
 5. Cost-effectiveness analysis
 6. Cost-utility analysis
 7. Health-related quality of life (HRQoL)
 8. Use of decision modeling in conducting pharmacoeconomic studies
 9. Use of guidelines to evaluate and interpret pharmacoeconomic literature
 10. Applications of pharmacoeconomics and pharmacoeconomic study evaluation
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and *Principles of Pharmacoeconomics*, 3rd edition.⁹ In addition to the textbooks, several current readings from the primary literature were assigned to reinforce key concepts and provide real world examples.

The course was organized and managed using the Blackboard (Blackboard Inc, Washington, DC) course

management system. The syllabus and all course hand-outs were posted on Blackboard for the students to access and print if desired. In addition, students had access to TurningPoint (Turning Technologies, LLC, Youngstown, OH) slides used in class, group project information, faculty information, and assigned articles. All assigned articles were placed on electronic reserve with the University library to provide easy student access and comply with copyright regulations. Blackboard also gave students the ability to see their test and project scores and communicate with classmates and instructors. Course faculty members frequently communicated with students via e-mail and by posting announcements for the class on the course Blackboard site. A major part of student assessment in the course was a group project. The Group Pages feature of Blackboard was utilized to facilitate communication among students in their groups. Group Pages functions that were used by students included the group discussion board, collaboration sessions (virtual classroom and chat), file exchange, and e-mail.

The instructors of the course felt strongly that a significant part of the course should involve students employing higher-level thinking skills including evaluation, synthesis, creativity, and other elements of critical thinking. Hence, in addition to 3 objective examinations, the students were required to complete a group project, and individual classroom participation was factored into the students' grades for the course.

Each objective examination consisted of 50 questions worth 2 points each (total of 100 points). Objective examination scores comprised 55% of the course grade. Each examination covered approximately a third of the course material. All examination questions were in multiple-choice format.

For the group project, students were required to develop a business plan and economic evaluation for a hypothetical clinical pharmacy service. The purpose of the project was to give students the opportunity to apply and integrate the ideas and concepts they learned in class, as well as to employ several higher-level thinking skills. Students were assigned to a group ranging in size from 8 to 9 students. Each group randomly selected their project pharmacy service from a group of 6 different scenarios, which included an immunization service, a lipid clinic, a diabetes clinic, an anticoagulation clinic, a medication reconciliation service, and a nursing home service. Each scenario included background information about the pharmacy or institution where the service would be offered. Pertinent information included type of pharmacy, location, number of full-time pharmacist and support staff members, hours of operation, prescription volume, and pharmacy layout and space availability. Each group also

had to designate a team coordinator. Responsibilities of the team coordinator included:

- Coordinating the efforts of the individual members of the group
- Corresponding with group members
- Corresponding with course faculty members regarding the project
- Arranging meetings for the group
- Setting individual, team, and project goals
- Maintaining the project timeline
- Submitting the final draft of the project

Students were told that their business plan and economic evaluation should include the following sections: title page, table of contents, executive summary, background and description, marketing analysis and strategy, operational structure and process, milestones/schedule/action plan, economic evaluation of the service, conclusion, supportive documents (job descriptions and flyer or brochure).

Students received a rubric created by course faculty members for the project. The rubric was detailed and served as a valuable tool for students to be successful in this assignment. A copy of the rubric is available from the authors. The group project was worth 200 points and comprised 36% of the course grade. Information regarding the content areas of the group project rubric and point distribution is located in Table 2.

Each student was expected to make substantial individual contributions to the project. Therefore, the instructors decided to base 15% of the project grade on the collaboration and work skills of each individual student. Students were evaluated by their group peers in 8 different work skill areas on a Likert scale of 1 to 4 on which 1 = poor, 2 = average, 3 = good, and 4 = excellent. A ninth area addressed the leadership and communication skills of the team coordinator. Students performed these evaluations using the Group Project Collaborative Work Skills Peer Evaluation, which was adapted by course faculty from a collaborative work skills rubric found on the Web¹⁰ and consisted of the following categories: contribution of ideas and participation, workload, problem solving, focus, time management, attitude, teamwork, pride, team coordinator skills (applies only to the team coordinator).

A copy of the Work Skills Peer Evaluation is available from the authors. Scores from all peer evaluations were averaged. The average score determined how many points the student earned as an individual in the area of collaboration. Table 3 illustrates how average peer evaluation scores were translated into collaboration points.

Students were informed that all peer evaluations would be kept confidential and only course faculty and

Table 2. Group Project Rubric Categories, Subcategories, and Point Distribution

Category	Number of Possible Points
Project Writing and Presentation	20 total
● Spelling, grammar, punctuation, sentence structure	5
● Level of writing and organization	10
● Literature review	5
Executive Summary	15 total
Background and Description	15 total
● Background information	5
● Description of services and mission	5
● Rational and purpose of program	5
Marketing Analysis and Strategy	20 total
● Evaluation of market	10
● Marketing strategy	10
Operational Structure and Process	20 total
● Service delivery	10
● Clinical, regulatory, and quality requirements	10
Milestones, Schedule, and Action Plan	10 total
Pharmacoeconomic Assessments	45 total
● Problem statement, background, and perspective	15
● Methodology	30
Conclusion	5 total
Supportive Documents	20 total
● Job descriptions	10
● Flyer or brochure	10
Collaboration Score	30 total
Total	200 points

teaching assistants would have access to these evaluations. Also, each group member evaluated all members of the group except him/herself. If a student did not submit peer evaluations for each member of the group, that student would have 10 points deducted from the individual project score.

Student participation in class was worth 50 points and comprised 9% of the course grade. At each lecture,

Table 3. Collaboration Points Earned Based on Average Peer Evaluation Score

Average Peer Evaluation Score	Number of Collaboration Points Earned
>29.0	30
25.0 – 28.9	25
21.0 – 24.9	20
17.0 – 20.9	15
13.0 – 16.9	10
<13.0	5

instructors presented questions in a multiple-choice or true/false format to the class using the TurningPoint audience response system. Students were able to respond to the questions using a radio-frequency keypad. Individual student answers were tracked and participation was evaluated based on the number of lectures in which students actively participated. Aside from the first class and examinations, there were 40 lecture/classroom meeting times. Students earned points based on the number of classes in which they participated. Students who participated in 38 or more classes earned 50 participation points; 30 to 37 classes, 40 points; 25 to 29 classes, 30 points; 20 to 24 classes, 20 points, and 19 classes or less, 10 points.

ASSESSMENT

One hundred fifty-three students were enrolled in the course. Evidence of student learning was captured through 3 objective examinations, a group project, and classroom participation. The results of these evaluations are presented in Table 4. The mean scores on the objective examinations (100 points per examination) ranged between 82 and 85 points, with 25%-35% of students in the class scoring over 90 points, and 40%-50% of students scoring from 80 to 89 points. The mean scores on the group project (200 points) and classroom participation (50 points) were 183.5 and 46.1, respectively. As described earlier, each student evaluated group peers in 8 different work skills, with scores ranging from 4 to 32. The mean score on group project peer evaluation was 30.8, with scores ranging from 27.5 to 31.7. The scores on the 3 objective examinations were analyzed to see how students were performing on the tests. Table 5 gives the distribution of class grades; 52.9% of students scored an A minus or better.

DISCUSSION

Consistent with the educational revision mandated by a large number of professional pharmacy organizations including the ACPE, this new pharmacy practice course offered students an opportunity to actively design, imple-

Table 5. Distribution of Grades

Grade	Number of Students	Percent of Class
A	55	35.9
A-	26	17
B+	29	19
B	34	22.2
B-	7	4.6
C+	2	1.3

ment, and evaluate pharmacy clinical services. Center for the Advancement of Pharmaceutical Education (CAPE) Outcomes were successfully integrated into the new course as evidenced by the students' ability to develop and implement clinical services through systematic application of business planning principles as reflected through their group projects. In line with the revised educational outcomes put forth by the American Association of Colleges of Pharmacy (AACP), the course assisted students in making a connection between what they learned and the potential applications in their practice.

The course assessed students' performance through objective examinations and a group project. The group project comprised one third of the course grade and required students to develop a business plan and economic evaluation of a clinical pharmacy service. Based on the content and quality of the group projects submitted by the students, the course faculty members were confident about the students' ability to develop, implement, and evaluate new pharmacy programs. Also, advocates of collaborative learning assert that group activity not only increases student interest in the course materials but also encourages critical thinking.¹¹⁻¹³ The presence of a peer support system helps students assimilate external knowledge, take responsibility for their own learning, and develop critical thinking skills.^{13,14} The course also used a group peer-evaluation format that facilitated student learning and helped them evaluate team dynamics and team performance characteristics. Given the changing nature of pharmacy practice and that pharmacists are increasingly working in teams, the instructors decided that this unique collaborative work-skill assessment tool would provide students with feedback regarding their effectiveness of working in a group.

The course has been offered once and all students enrolled in the course received a passing grade. Results of student performance and assessment and student evaluations suggest that the course was valuable for students learning the development, implementation, and evaluation of clinical pharmacy services using a systematic business plan. The course offered a variety of activities to help develop and improve critical thinking and writing

Table 4. Student Assessment Results (n = 153)

	Min	Max	Mean (SD)	Median
Exam 1	66	100	85.49 (6.78)	86
Exam 2	58	98	83.71 (7.50)	84
Exam 3	54	98	82.80 (8.54)	84
Group project	152	198	183.49 (9.28)	185
Group peer-evaluation	27.48	31.74	30.75 (1.02)	31
Class participation	30	50	46.08 (5.53)	50

skills. Even though the students achieved passing scores on their examinations and assignments, there were concerns expressed regarding course workload and relevancy of the material with regards to the daily activities of a pharmacist.

The course was a positive experience for the faculty members. Even though the course required intensive preparation, from designing the syllabus and group projects to creating rubrics for project and peer-evaluations, the end result was professionally rewarding. Students had the opportunity to actively integrate didactic knowledge into their hypothetical clinical service as evidenced by the group project. Some of the students acknowledged that the skills they gained in class were useful during their internships and experiential rotations.

There are limitations we would like to address. First, even though the instructors believe that successful completion of the group project and objective examinations indicate student comprehension of the subject area, a more formal pre-post evaluation of the students' knowledge acquisition would have been appropriate. Second, a teaching effectiveness questionnaire that assessed the individual teaching performance of each faculty member was conducted. However, a student evaluation of the course as a whole was not performed.

In preparation for the second offering of the course, the 3 faculty members have outlined course improvements to help students anticipate future developments in their profession. Specifically, 2 guest lecture sessions are being incorporated to demonstrate the growing importance of offering innovative clinical services. The course faculty members will be integrating case studies into lecture material to further illustrate business planning and pharmacoeconomics concepts. Journal articles describing the importance of implementation and economic viability of clinical pharmacy services will be discussed in class. Finally, the instructors have plans to develop a student assessment tool that is specific for this course in order to gain valuable feedback concerning all course aspects, including the group business plan project.

CONCLUSION

A new required pharmacy practice course was introduced to the third-year PharmD curriculum, providing pharmacy students with the framework necessary to de-

velop and implement evidence-based disease management programs and to assure efficient, cost-effective utilization of pertinent resources in the provision of patient care. The course will continue to emphasize to our students the growing importance of offering and evaluating innovative clinical pharmacy services.

REFERENCES

1. American Association of Colleges of Pharmacy. ACCP Defines Clinical Pharmacy; 2005. Available at: <http://www.accp.com/report/rpt0805/art01.php>. Accessed May 31, 2007.
2. ASHP Vision Statement for Pharmacy Practice in Hospitals and Health Systems 2001. Available at: http://www.ashp.org/s_ashp/cat1c.asp?CID=2911&DID=4029. Accessed May 31, 2007.
3. Joint Commission of Pharmacy Practitioners Future Vision of Pharmacy Practice. Available at: <http://aacp.org/site/view.asp?TRACKID=&VID=2&CID=1177&DID=6725>. Accessed October 2, 2007.
4. American Association of Colleges of Pharmacy Center for the Advancement of Pharmaceutical Education Educational Outcomes 2004. Available at: http://www.aacp.org/Docs/MainNavigation/Resources/6075_CAPE2004.pdf. Accessed October 2, 2007.
5. American Council for Pharmaceutical Education. Accreditation Standards and Guidelines for the Professional Program in Pharmacy Leading to the Doctor of Pharmacy Degree. Available at: http://www.acpe-accredit.org/pdf/ACPE_Revised_PharmD-Standards_Adopted_Jan152006.pdf Accessed May 31, 2007.
6. Madhavan SS, Rosenbluth SA, Amonkar M, et al. Pharmacists and immunizations: a national survey. *J Am Pharm Assoc.* 2001;41:32-45.
7. Schumock G. *How to Develop a Business Plan for Clinical Pharmacy Services: A Guide for Managers and Clinicians.* 1st ed. Kansas City, MO: American College of Clinical Pharmacy; 2001.
8. Brown T. *Handbook of Institutional Pharmacy Practice.* 4th ed. Bethesda, MD: American Society of Health-System Pharmacists, Inc; 2006.
9. Bootman JL, Townsend RJ, McGahn WF. *Principles of Pharmacoeconomics.* 3rd ed. Cincinnati, OH: Harvey Whitney Books Company; 2005.
10. Collaborative Work Skills: Group Work. Bibliographical Center for Research. Available at: www.cdphheritage.org/educator/documents/depressionrubric1.doc. Accessed May 31, 2007.
11. Johnson RT, Johnson DW. Action research: cooperative learning in the science classroom. *Science Children.* 1986;24:31-2.
12. Totten S, Sills T, Digby A, Russ P. *Cooperative Learning: A Guide to Research.* New York:Garland; 1991.
13. Gokhale AA. Collaborative learning enhances critical thinking. *J Technol Educ.* 1995;7:1.
14. Vygotsky L. *Mind in Society: The Development of Higher Psychological Processes.* Cambridge: Harvard University Press; 1978.