

An Outcomes Research (Pharmacoeconomics/Pharmacoepidemiology) Course for PharmD Students

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The project's purpose was to develop an elective outcomes research course for second and third-year Doctor of Pharmacy students at Creighton University and the University of Nebraska Medical Center. Students' course outcomes included: (i) describe the concepts and methodology of these studies; and (ii) design and present an outcomes research proposal to fellow students. Students' outcomes are achieved through assigned readings, lectures, analyzing case studies and completing a study proposal. The outcomes research course was evaluated by sending a questionnaire to students (n=31) who have completed the course. Since this course has evolved over the past four years, students enrolled in 1998 (current, n = 10) were compared to students taking the course from 1995-97 (previous, n = 21). Students' ratings show they were "slightly familiar" with most topic areas before taking the course. After taking the course, students generally reported a high level of usefulness for most items and current students were slightly higher for these items than were previous students. This course familiarized students with the breadth of outcomes research studies, both from a "consumer" of research and from a researcher's perspective.

LITERATURE REVIEW

This project's purpose was to develop an elective outcomes research course for second and third year Doctor of Pharmacy students at Creighton University and the University of Nebraska Medical Center (UNMC). This outcomes research course included two primary components: Pharmacoeconomics and Pharmacoepidemiology.

Pharmacoeconomics as a component of outcomes research is a young and growing field. This growth is evidenced by the expansion of research positions in the pharmaceutical industry, faculty positions at colleges of pharmacy, and growing membership in organizations such as the International Society for Pharmacoeconomics and Outcomes Research (ISPOR). Graduate programs in pharmacy administration are increasingly requiring additional course work in this area. Surprisingly, little has been published regarding development of outcomes research courses particularly in the areas of pharmacoeconomics and pharmacoepidemiology for the Doctor of Pharmacy degree.

Kolassa described a course in pharmaceutical economics taught at the University of Mississippi(1). He suggested that past research has shown that pharmacy curricula do not adequately prepare students for conducting or using pharmacoeconomic research studies. His manuscript provides a rationale for inclusion of a pharmaceutical economics course in the curriculum. The course was subdivided into five sections: (i) introduction to pharmaceutical economics; (ii) an overview of methodologies and exercises; (iii) pharmaceutical economic research designs; (iv) quality of life and related issues; and (v) uses of pharmaceutical economic information in decision mak-

ing and public policy. Various exercises, readings and objectives are listed for each course section.

Armstrong described the evaluation of a pharmacoeconomics course taught to Japanese students(2). Armstrong developed this elective course as a visiting foreign professor from the United States to a private Japanese university school of pharmacy. His course was designed for fourth year pharmacy students in the last year of their BS program at Kobe Gaquin University in Japan. He also designed a survey to determine whether Japanese pharmacy students understood basic concepts and to evaluate their attitudes toward pharmacoeconomics before and after this elective course. His study showed that students generally understood the importance of knowing costs and consequences of drug therapy alternatives. Students also had a reduction in apprehension about pharmacoeconomics at the end of the course. Elements of Armstrong's assessment are incorporated into our course evaluation.

Rascati in 1997, conducted a survey of pharmacoeconomic course-work in schools of pharmacy in the United States (79 of 79 colleges responded). Sixty-four of 79 schools (81 percent) provided pharmacoeconomic education at some level. The number of clock hours spent on providing pharmacoeconomic education for BS in Pharmacy students (n = 28) ranged from two to 60 hours with a mean of 15 (SD = 16), and a median of eight hours. Schools with PharmD programs (n = 57), provided from two to 160 clock hours, with a mean of 24 (SD =25), and a median of 16 hours. For schools offering graduate programs (n = 36), the clock hours ranged from 15 to 140 with

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a mean of 49 (SD = 29), and a median of 45 hours(3).

A search of the pharmaceutical literature (International Pharmaceutical Abstracts or IPA), from 1970 through 1998, revealed only two outcomes research courses that were presented at national pharmacy meetings. Gupchup presented a poster at the 1997 AACP meeting entitled, "A Pharmacoeconomics and Outcomes Research Seminar Course for Tracking PharmD Students."⁽⁵⁾ This course was offered to third-year professional students. Each week students read a peer-reviewed article. A ten-question quiz was administered the first and last weeks of the semester to assess student knowledge. Of the nine students enrolled, a significant improvement in student knowledge from pretest to post-test was achieved. Students' comments showed that the course was deemed as very useful and added a new perspective to their decision making abilities. A second course by the authors of this paper was also presented as a poster at the 1997 AACP Annual Meeting. The paper entitled, "Outcomes Research: Pharmacoeconomics and Pharmacoepidemiology Course for PharmD Students" described an elective outcomes research course for second and third year Doctor of Pharmacy students from the two respective universities⁽⁶⁾. Similar to pharmacoeconomics, pharmacoepidemiology as a component of outcomes research is a young and growing field. Epidemiology as the research arm of public health is a growing field as evidenced by the expansion of research positions in state and national governmental levels, the pharmaceutical industry, faculty positions at colleges of pharmacy, and the growing membership in organizations, such as the International Society for Pharmacoepidemiology (ISPE). Increasingly, graduate programs in medicine, pharmacy and public health are offering course work in this area.

Surprisingly, little has been published regarding development of pharmacoepidemiology courses. The field of pharmacoepidemiology is a subspecialty within epidemiology, which is the distribution of disease and health in human populations and those factors that have either a positive or adverse effect on health status. With the present managed care focus, Mullins described the increased demand for researchers who are trained in both the epidemiology and economics of drug evaluation and treatment.⁴ Mullins suggested that currently there is a shortage of individuals who have true expertise in both epidemiology and economics.

Course Description. An elective outcomes research course was developed for second and third-year Doctor of Pharmacy students at Creighton University and the University of Nebraska Medical Center (Appendixes A and B). While most pharmacy curriculums offer course work in pharmacoeconomics, and a smaller number offer course work in pharmacoepidemiology, few offer course work in both areas. The authors decided to combine their expertise in the same course and offer pharmacoepidemiology and pharmacoeconomics in one course. After the initial course offerings (1995-1996), the instructors adopted the ACCP Pharmacoeconomics Self-Study Modules to teach the economics component (1997-1998). A reading packet of journal articles has been used for the epidemiology and economics components. Initially (1995-1996), the instructors utilized primarily a lecture format. Each week, the instructors divided the two-hour period discussing both Pharmacoeconomics and Pharmacoepidemiology topics and also discussed the case assigned for the week. In subsequent course offerings (1997-1998), the instructors used a seminar approach, with the students primarily responsible for presenting topics covered in the ACCP modules. Instructors served as

content experts and to extend discussion points.

Since most students did not have previous outcomes research experience, the instructors guided development of a research project proposal and assisted with study design. Throughout the history of the course, each student has been required to prepare a research proposal to conduct an outcomes research study. Selection of the topic report, literature review, design report, first draft of written proposal, and final proposal and presentation were due on scheduled dates. While the student was not required to complete the project for this course, the instructors encouraged the students to continue their involvement after the course was completed.

COURSE EVALUATION

The outcomes research course was evaluated by sending a mail questionnaire to students who have completed the course (n = 31). Demographic items included current practice setting, gender, pharmacy school, and pharmacy practice area most interested in. Attitudes, familiarity level and perceived usefulness of material presented were assessed. Students were asked how familiar they felt about each topic before taking the course on a five-point Likert scale from 1, not at all familiar to 5, very familiar. Students were also asked how useful they felt each topic would be to their pharmacy career on a Likert scale from 1, not at all useful to 5, very useful. Course format items were listed on a Likert scale from 1, weak to 5, strong. Armstrong's survey items⁽²⁾ to measure pharmacy students attitudes and future expectations about pharmacoeconomics were adapted to measure outcomes research viewpoints and incorporated into our course assessment. Students were also asked to rate their agreement in the course subject areas on a Likert scale from 1, strongly disagree to 5, strongly agree. All data were entered into a SAS database⁽⁷⁾ using the mainframe computer at UNMC.

RESULTS

Sample Characteristics. Since this course has evolved over the past four years, students who enrolled in 1998 (n=10) were compared to students enrolled from 1995-97 in the course (n=21). Of the 31 students who have taken this course, all responded (Table I). The OR course was taken by more UNMC students (n=17) than Creighton students (n=14). Most respondents worked in part-time pharmacy intern positions. Hospital pharmacy was the most commonly reported pharmacy practice setting. For this course population, only three students reported working in a community pharmacy setting. The pharmacy practice areas that students reported most interested in was "other than those listed, but within a pharmacy career path" (n = 6) or hospital pharmacy (n = 5). Sample characteristics (gender, degrees obtained) generally reflect demographic distribution characteristics of both colleges (Table I).

Familiarity of Outcomes Research Topic Areas. Using a Likert scale from 1, not at all familiar to 5, very familiar, students were asked to rate their level of familiarity with each topic before taking the course (Table II). Students ratings reflect that they were "slightly familiar" to "not very familiar" with most items. Current students were more familiar with the majority of topics than were previous students. These findings suggest that the introductory (pharmacoepidemiology and pharmacoeconomics) lecture and recitations for "Pharmacy and Health Care" at UNMC and for "Health Care Systems" at Creighton University, have increased student familiarity with outcomes research at both colleges.

Table I. Sample characteristics

Topic	Total students ^a n=31		Current n=10		Previous n=21	
	n	Percent	n	Percent	n	Percent
Pharmacy school						
Nebraska	17	54.8	6	60.0	11	52.4
Creighton	14	45.2	4	40.0	10	47.6
Gender						
Female	17	54.8	7	70.0	10	47.6
Male	14	45.2	3	30.0	11	52.4
Current pharmacy practice setting						
Independent community pharmacy	1	3.2	-		1	4.8
Chain community pharmacy	2	6.4	1	10.0	1	4.8
Hospital pharmacy	10	32.3	2	20.0	8	38.1
Pharmaceutical industry	1	3.2	-		1	4.8
Mail service pharmacy	2	6.4	-		2	9.5
Education	1	3.2	1	10.0	-	
Not working in a pharmacy	6	19.4	3	30.0	3	14.3
Other	5	16.1	2	20.0	3	14.3
Missing	3	9.7	1	10.0	2	9.5
Primary position at this pharmacy						
Staff pharmacist	3	9.7	-		3	14.3
Clinical pharmacist	1	3.2	-		1	4.8
Educator/researcher	4	12.9	4	40.0	-	
Pharmacy intern/tech	12	38.7	3	30.0	9	42.9
Not working in a pharmacy	7	22.6	3	30.0	4	19.1
Other	2	6.4	-		2	9.5
Missing	2	6.4	-		2	9.5
Pharmacy practice area most interested in						
Independent community pharmacy	2	6.4	-		2	9.5
Chain community pharmacy	1	3.2	-		1	4.8
Hospital pharmacy	5	16.1	3	30.0	2	9.5
Academia-teaching	3	9.7	3	30.0	-	
Pharmaceutical industry	3	9.7	1	10.0	2	9.5
Other, within a pharmacy career path	6	19.4	1	10.0	5	23.8
Other, outside of a pharmacy career path	-		-		-	
Missing	11	35.5	2	20.0	9	42.9

^a Total students, current course students 1998 and previous course students previous three years, 1995-1997.

Table II. Students' level of familiarity^a about each topic, before taking the course

Topic	Total students ^b n=31		Current n=10		Previous n=21	
	n	SD	n	SD	n	SD
Pharmacoeconomics overview	2.8	1.3	3.5	1.3	2.5	1.1
Pharmacoepidemiology overview	2.5	1.2	3.1	1.1	2.2	1.2
Cost of illness	2.8	1.3	3.7	1.3	2.4	1.1
Case-control studies	2.9	1.3	3.7	1.3	2.5	1.1
Justifying clinical services	2.7	1.1	2.8	1.0	2.7	1.2
Cost minimization analysis	2.8	1.4	3.8	1.3	2.3	1.2
Cost benefit analysis	2.8	1.3	3.7	1.4	2.5	1.1
Cost effectiveness analysis	2.8	1.4	3.5	1.4	2.5	1.2
Cost utility analysis	2.2	1.1	2.7	1.3	2.0	0.9
Sensitivity analysis	2.3	1.2	2.6	1.4	2.1	1.2
Medicaid databases/ Automated databases	2.3	1.2	2.7	1.3	2.1	1.2
Decision analysis/ Medical decision making	2.1	1.0	2.4	1.4	2.0	0.8
Health status	2.7	1.1	3.3	1.0	2.5	1.0
Patient satisfaction	3.0	1.0	3.3	0.8	2.9	1.0
Research proposal	2.9	1.3	4.1	1.0	2.4	1.1

^a Likert scale from 1, not at all familiar to 5, very familiar.

^b Total students, current course students 1998 and previous course students previous three years, 1995-1997.

Table III. Students' perceived level of usefulness^a of each topic to their pharmacy careers

Topic	Total students ^b (n=31)		Current (n=10)		Previous (n=21)	
	n	SD	n	SD	n	SD
Pharmacoeconomics overview	4.3	0.8	4.5	0.5	4.2	0.9
Pharmacoepidemiology overview	4.3	0.7	4.6	0.5	4.1	0.8
Cost of illness	3.9	0.8	4.4	0.7	3.7	0.8
Case-control studies	4.1	1.0	4.2	0.8	4.0	1.0
Justifying clinical services	4.5	0.7	4.7	0.5	4.4	0.7
Cost minimization analysis	4.1	0.8	4.1	0.9	4.1	0.8
Cost benefit analysis	4.2	0.7	4.3	0.8	4.2	0.7
Cost effectiveness analysis	4.3	0.7	4.3	0.8	4.3	0.6
Cost utility analysis	3.8	1.1	3.9	1.3	3.8	1.0
Sensitivity analysis	3.7	1.0	3.9	1.3	3.6	0.9
Medicaid databases/ Automated databases	3.9	0.9	4.2	0.6	3.7	1.0
Decision analysis/Medical decision making	4.2	0.9	4.3	0.7	4.1	0.9
Health status	4.0	1.0	4.2	1.3	3.9	0.8
Patient satisfaction	4.3	0.8	4.4	1.0	4.2	0.7
Research proposal	4.0	1.1	4.7	0.5	3.8	1.1

^a Likert scale from 1, not at all useful to 5, very useful.

^b Total students, current course students 1998 and previous course students previous three years, 1995-1997.

Table IV. Students' rating of course strength^a for each format item

Topic	Total students ^b (n=31)		Current (n=10)		Previous (n=21)	
	n	SD	n	SD	n	SD
Value of this material to your education	4.3	0.8	4.4	0.7	4.2	0.8
Your background for this course	3.3	1.2	3.7	1.3	3.1	1.1
Course organization	3.7	1.1	4.0	0.8	3.6	1.1
Course coordinator Dr. Pedersen and Dr. Scott	4.4	0.7	4.6	0.5	4.3	0.8
Overall assessment	4.3	0.7	4.5	0.5	4.1	0.8

^a Likert scale from 1, weak to 5, strong.

^b Total students, current course students 1998 and previous course students past three years, 1995-1997.

Usefulness of Outcomes Research Topic Areas. Table III reports on the students perceived level of usefulness of each topic to their pharmacy career on a Likert scale from 1, not at all useful to 5, very useful. Overall, students reported a high level of usefulness for most items. Current students generally reported a slightly higher level of usefulness for most topic areas than did previous students. Highest rated topics were "justifying clinical services," "pharmacoeconomics overview," "pharmacoepidemiology review," "cost-effectiveness analysis," and "patient satisfaction." The research proposal was deemed more useful by current students (mean = 4.7) than by previous students (mean = 3.8).

Outcomes Research Course Format items. Five items regarding the format of the course were rated by each student using a Likert scale from 1, weak to 5, strong. Overall assessment of the course was rated 4.3 out of a five-point scale (Table IV). Current students rated the course somewhat higher than previous students. Both co-principal instructors were rated strong (mean = 4.4) with current students rating being slightly higher than previous students' ratings. Students' response for two items "your background for this course" (mean = 3.3) and "value of this material to your education" (mean = 4.3) confers convergent support, respectively, to the level of familiarity (Table II) and level of usefulness (Table III).

Outcomes Research Attitudes and Future Expectations.

Students' level of agreement with attitudinal statements modified from Armstrong 2 were measured on a Likert scale (1 = strongly disagree to 5 = strongly agree). Overall, respondents strongly agreed (mean = 4.5) that pharmacists need to know how to evaluate and interpret outcomes research journal articles (Table V). However, respondents held neutral viewpoints (mean = 3.5) that outcomes research should be a required topic for all pharmacy students. Students disagreed (mean = 2.1) with the statement that outcomes research was too complicated. Respondents agreed that outcomes research is considered important now (mean = 3.9) and in the future (mean = 4.4) by the pharmaceutical industry. Students' were neutral (mean = 3.3) on the present importance of outcomes research to the U. S. government. However, students strongly agreed that outcomes research will be important to the U.S. government in the future (mean = 4.3).

DISCUSSION

This manuscript's goals are to describe an outcomes research course that is unique in content and format and to report the student assessment of the course content. Economics and epidemiology principles are integrated in this outcomes research course focusing on drug products. Instruction takes place in an environment where institutional barriers are set aside. Students

Table V. Students' level of agreement^a with statements about outcomes research

Topic	Total students ^b (n=31)		Current (n=10)		Previous (n=21)	
	n	SD	n	SD	n	SD
Outcomes research was a completely new topic to me	3.2	1.3	2.9	1.5	3.3	1.3
I became apprehensive when I thought about using outcomes research principles	2.8	1.4	2.9	1.6	2.8	1.3
Outcomes research was too complicated for me	2.1	1.0	2.2	1.1	2.1	0.9
Pharmacists need to know how to evaluate and interpret outcomes research journal articles	4.5	0.8	4.5	0.5	4.5	1.0
In the future, outcomes research should be a required topic for all pharmacy students	3.5	1.3	3.2	1.2	3.6	1.3
I see a great need for promoting outcomes research to health care professionals	4.2	0.8	3.9	0.9	4.4	0.8
Presently, outcomes research is considered important by the U.S. government	3.3	1.1	3.7	0.8	3.0	1.1
In the future, outcomes research will be considered important by the U.S. government	4.3	0.8	4.2	1.0	4.3	0.8
Presently, outcomes research is considered important by the U.S. pharmaceutical industry	3.9	1.1	4.4	0.5	3.7	1.2
In the future, outcomes research will be considered important by the U.S. pharmaceutical industry	4.4	0.8	4.5	1.0	4.4	0.8

^a Likert scale from 1, strongly disagree to 5, strongly agree.

^b Total students, current course students 1998 and previous course students past three years, 1995-1997.

from two universities, Creighton University and the University of Nebraska Medical Center, take the same course, dividing class time between campuses.

Course development evolved over four years, from 1995 through 1998. Initially, this course used the "Principles of Pharmacoeconomics" text by Bootman, Townsend, and McGhan. For the past two years, the instructors switched the text to the American College of Clinical Pharmacy (ACCP), "Pharmacoeconomics and Outcomes: Applications for Patient Care" text. The switch in course texts was made for two reasons: (i) the instructors changed the format from a lecture format to seminar-based format; and (ii) our pharmacy students found the readings easier to comprehend and the exercises presented in the ACCP text challenging and satisfying. The pharmacoepidemiology component has consistently been delivered with the aid of the "Pharmacoepidemiology" text by Brian Strom. Both areas have been supplemented with additional readings.

Current students were more familiar with the majority of topics than were previous students (Table II). Current students also reported a higher level of usefulness for most outcomes research topic areas than did previous students (Table III). These differences are somewhat difficult to interpret. Are these differences due to students' perceptions of relative importance of outcomes research in the curriculum or the various changes that occurred in the course (*i.e.*, teaching method)? Both are plausible suppositions. The authors believe most of this difference is due to the changes in teaching methods. Active learning is an effective educational strategy that has been increasingly integrated into the course format. Generally students have shown a keen interest in the interactive exercises, group

presentations and student presentations in this course. Through these active learning strategies, students usually grasped the course content with greater depth and precision.

Students' generally valued the material presented in this elective course in their pharmacy education (Table IV). Students also believe that pharmacists need to know how to evaluate and interpret outcomes research journal articles (Table V). Most of the students who elect to take this course are presently practicing in other than retail pharmacy environments. These findings suggest that these students and graduates of our programs are thinking beyond traditional community practice settings for employment. This may be the nature of the

¹ Ball, E.S., and Pedersen, C.A., "Baby Boomer Induced Pharmaceutical Care Opportunities." American Society of Health-System Pharmacist Midyear Clinical Meeting, New Orleans, Louisiana. December 11, 1996; Letcher, L.A., Smith, M., Chase, J., Scott, D.M., "Peer Led Alcohol Education Program (PLAE)." American Pharmaceutical Association Annual Meeting, Los Angeles, California. March 9, 1997; Graff, J., Nichols, B., Scott, D.M., Pedersen, C.A., "Decision Analysis: The Role of Pharmacy Based Influenza Immunizations in Reducing Health Care Costs." American Pharmaceutical Association Annual Meeting, San Antonio, Texas. March 1999; Lyman, T.A., Pedersen, C.A., North, J., "Pharmacist Activities as AADE Certified Diabetes Educators." American Pharmaceutical Association Annual Meeting, San Antonio, Texas. March 1999; Donner-Tiernan, C.S., Pedersen, C.A., Tiernan, Jr., J.B., "Nebraska Pharmacists' Compensation for Pharmaceutical Care." American Pharmaceutical Association Annual Meeting, San Antonio, Texas. March 1999.

² Scott, D.M., Camras, C.B., Adams, J.C., Pedersen, C.A., Faulkner, T., Cost-Effectiveness Comparison of Latanoprost and Timolol in Glaucoma Patients. UNMC Outcomes Research Grant Program. March 1, 1998 to September 1, 2000; Letcher, L.A., Scott, D.M., Peer Led Alcohol Education (PLAE) Project. APhA/Merck Student Pharmacy Project Grant, American Pharmaceutical Association. May 1, 1996 -April 30, 1997.

students electing to take such a challenging course as an elective when less difficult elective courses are available at both universities. The investigators believe that students interested in outcomes research tend to lie outside of traditional community pharmacy settings. Another explanation is that students interested in practicing in traditional community pharmacy settings do not perceive the relevance of such course work in those practice settings. While a large majority of students from both schools opt for community practice settings upon graduation, the students taking this course do not appear to follow this trend.

Of interest to the authors is the positive feedback received from the students. The authors believe that the positive student response to the course was partially a function of the instructors' preparation prior to the course. Student feedback has been incorporated into the course format. The interactive nature of this course also stimulated student interest in these subjects. While this course is considered "very difficult" by the students and faculty, the students appreciate the opportunity to learn material they perceive as useful in their careers.

Six of 31 students (19.4 percent) from this course have taken the opportunity to present their work at local, state and national meetings.¹ Another five of 31 students (16.1 percent) have continued work on their projects and have submitted them as grants or contracts and two have been funded.² The work of two students has been published(8,9). The instructors advocated students initiated research projects, however, they also supported involvement in instructor initiated projects as well. Our hope is that other schools and colleges of pharmacy will encourage pharmacy students to pursue the presentation and publication of their outcomes work in such research forums.

Study Limitations. One limitation is the self-reported nature of the study. A second limitation occurs by comparing the current course students (1998) with a previous student group (previous three years, 1995-1997). Comparison of the current group to the previous group is compromised by the problem of recall bias from what happened in earlier years. While students will remember general information about an individual course, specific information is more difficult. In this study, we provided comparison of frequency distributions of findings. Further comparison of these two groups would provide misleading results and was not done.

CONCLUSION

This course familiarizes students with the breadth of outcomes research studies and gives them experience in solving problems from a researcher's perspective. While the students and faculty considered this course as very difficult, the students appreciated the opportunity to learn material they perceive as very useful to their careers. The authors believe that schools and colleges of pharmacy should provide more outcomes research course work at both the professional and graduate level. By doing so, educators will train future pharmacists to consider the assessment of economic, clinical, and humanistic outcomes when recommending treatment modalities.

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APPENDIX A. OUTCOMES RESEARCH (PHARMACOECONOMICS AND PHARMACOEPIDEMIOLOGY) COURSE SYLLABUS

Objective

An elective outcomes research course for second and third-year Doctor of Pharmacy students at Creighton University and the University of Nebraska Medical Center. Pharmacoeconomics (PEC) and pharmacoepidemiology (PEP) is the study of the safety, efficacy and appropriate use of a drug in large populations. Upon completion of this course, the student should be able to:

- Describe the U.S. drug approval process
- Assess the appropriateness of terminology used in these studies
- Analyze the social and economic forces impacting upon pharmacy practice in varying managed care environments
- Describe the concepts and principles of controlled clinical trials, pharmacoeconomics studies and postmarketing studies
- Assess the methodology of a pharmacoeconomics study or a pharmacoepidemiology study
- Design a pharmacoepidemiology or pharmacoeconomics research proposal and present this proposal to the students

Methods

- Achieving the students outcomes are accomplished through assigned readings, lectures, analyzing case studies, and completing a study proposal

Research project

- Each student required to prepare a proposal to conduct a PEC study or PEP study
- Proposal must include assurances of data availability and cooperation of parties needed to complete the study
- Proposal should be written with the idea that you or your successor will conduct this study
- Selection of topic report, literature review, design report, first draft of written proposal, and a final proposal and presentation of the proposal are due on scheduled dates
- Students are not required to conduct and complete the project for this course
- Instructors guided development of project proposals and assist with the study design

Texts

- Pharmacoeconomics and Outcomes: Applications for Patient Care. ACCP, 1996. Modules 1,2, and 3.
- Reading packet on selected epidemiology, economics, and outcomes research (Available on the first day of class)

On reserve in library

- Drummond MF, Stoddart GL, and Torrance GW. *Methods for the Economic Evaluation of Health Care Programmes*. Oxford

University Press, 1989.

- Strom BL, ed. *Pharmacoepidemiology*. Second edition. New York: John Wiley and Sons, 1994.

Grading

Exam 1	25%
Exam 2	25%
Student project (paper)	40%
Student presentation	10%
Total =	100%

APPENDIX B. OUTCOMES RESEARCH COURSE LECTURE AND CASE STUDY SCHEDULE

Week	Topic	Case Study Experience
1	Orientation Pharmacoeconomics Overview	Case: Cost Identification Case: Selection of the evaluation method
2	Drug Approval Process Pharmacoepidemiology Overview	
3	Proposal Development Example Student Project Presentation	Case: Investigating outcomes research question Case: Principles of economic assessment
4	Cost of Illness Cost Minimization Analysis Case-Control Studies	Case: Cost-of-illness analysis Case: Calculation of migraine costs with a managed care organization
5	Cost Benefit Analysis Cost Effectiveness Analysis Case-Control Studies	Case: Estimation of direct benefits as costs averted Case: Interpretation of ratio data Case: Decision on a new biologic on formulary Case: Asthma mortality and inhaled Fenoterol series
6	Cost Utility Analysis	Case: Calculation of quality-adjusted life years Case: Calculation of well-years
7	Medical Decision-Making/ Sensitivity Analysis	Case: Decision analysis for GERD treatment Case: Sensitivity analysis in formulary decisions
8	Guidelines for Evaluation Cohort Studies	Case: Evaluation of an article from the literature Case: Oral contraceptives and risk of CV disease
9	FALL BREAK — NO CLASS	
10	Patient-Based Assessments Medicaid and Automated Databases Data Sources and Tools for Measuring Humanistic Outcomes	Case: History of patient-based assessments Case: Sources for economic outcomes analysis Case: Questionnaire administration
11	Health Status	Case: Outcomes from a patient perspective Case: Health status instruments
12	SF-36	Case: Health status instruments Case: Computing scores
13	Patient Satisfaction Justifying clinical services	Case: PSQ-18 items and scales Case: Calculation of satisfaction scale scores Case: Justification of a clinical pharmacy service
14	Software Demonstration Data™ 3.0 - TreeAge Software, Inc.	
15 & 16	Proposal Presentations	