RESEARCH ARTICLE

Pharmacoeconomic Education in US Colleges and Schools of Pharmacy: An Update

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Submitted August 8, 2007; accepted December 13, 2007; published June 15, 2008.

Objectives. To determine the extent of pharmacoeconomics education at US pharmacy colleges and schools in 2007.

Methods. An e-mail survey was developed and sent to pharmacoeconomics instructors at all US colleges of pharmacy.

Results. Of the 90 colleges and schools of pharmacy that completed the survey, 7 colleges and schools did not currently have someone teaching pharmacoeconomics (eg, new school or looking for instructor). For the 83 colleges and schools that had an instructor who taught pharmacoeconomics, 69 covered pharmacoeconomic-related topics in a required course only; 5, in an elective course only; and 9, in both a required and elective course. The number of hours of pharmacoeconomic-related topics presented in required courses ranged from 1 to 48 hours (mean = 21 ± 14 ; median = 19).

Conclusions. Pharmacoeconomics education courses are offered at the majority of US colleges and schools of pharmacy. There was a wide range of hours devoted to pharmacoeconomic-related topics and the topics covered in these colleges and schools varied. Although the majority of US colleges and schools of pharmacy offer pharmacoeconomics courses, official guidelines are needed for the specific aspects and topics that should be covered in the classroom.

Keywords: pharmacoeconomics education

INTRODUCTION

Pharmacoeconomics is a subset of health care economics that compares costs and outcomes involving pharmaceutical products and services.¹ This discipline utilizes an evidence-based approach, and overlaps with fields of health economics and clinical or humanistic outcomes.² The United States spends more money on health care, including prescriptions, than any other country, and this continues to grow each year.³ Pharmacoeconomics plays a pivotal role in formulary decision-making and has value when assessing biotechnology drugs, therapeutic drug monitoring, and disease management. Pharmacoeconomics is increasingly used by formulary committees to help determine the status of particular medications (eg, whether the drug will be placed on the formulary and what restrictions will be imposed on its use).^{4,5} In addition, as pharmacy services in the US expand to include programs such as medication therapy management (MTM), the need for pharmacoeconomics analyses to measure the value of these services has increased.⁶ There is a demand

for professionals, particularly pharmacists, who have been trained in pharmacoeconomics.^{2,7}

The Accreditation Council for Pharmacy Education (ACPE) developed standards and guidelines for professional programs in pharmacy leading to a doctor of pharmacy (PharmD) degree. These guidelines became effective in July 2007. The following topics can be found under the pharmacoeconomics guidelines heading: economic principles in relation to pharmacoeconomic analysis, concepts of pharmacoeconomics in relation to patient care, applications of economic theories, and health-related quality-of-life concepts to improve allocation of limited health care resources.⁸ In addition, the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) Educators' Toolkit Task Force was created to establish useful teaching resources for the pharmacoeconomics educator. The web site includes a list of books and articles that provide an understanding of the field of pharmacoeconomics.⁹ One of the authors (KR) is a member of this Task Force and was charged with updating previous research on the extent of pharmacoeconomic education in US¹⁰ and non-US¹¹ colleges and schools of pharmacy.

A previous study looking at the extent of pharmacoeconomic education in US colleges and schools of

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pharmacy was conducted about 10 years ago, and it was suggested that future studies should investigate what topics were covered in the pharmacoeconomics curriculum.¹⁰ The purpose of this study was to provide an update by re-surveying US colleges and schools of pharmacy in 2007.

METHODS

A survey was conducted during the 1996-1997 academic year to determine the extent of pharmacoeconomic education in US colleges and schools of pharmacy. The researchers asked 4 questions: (1) Does your school of pharmacy provide pharmacoeconomics education? (2) How many clock hours are devoted to pharmacoeconomics education? (3) Is the education part of the required or elective curriculum? (4) How many students receive this education per year?

In early 2007, phone calls were made to 1 faculty member at each of the 90 US colleges and schools of pharmacy listed in the AACP 2006-2007 roster,¹² asking if pharmacoeconomic-related topics were being taught in their PharmD curriculum. If so, they were asked for a contact name and e-mail address of the professor/instructor who was responsible for covering these topics.

In May 2007, a survey was e-mailed to pharmacoeconomic instructors at each of the colleges and schools teaching pharmacoeconomics (determined via the phone calls). Questions similar to the 1996-1997 survey were used to determine: whether pharmacoeconomic-related topics were covered in a required or elective course; the number of hours devoted to these topics each year; and the number of students in the course each year.¹⁰ Two new survey items were added: respondents were asked to list the topics covered in the course and the resources (books or articles) used in the course.

After 2 weeks, a reminder with a copy of the survey instrument was e-mailed to nonrespondents. Follow-up faxes were sent and/or phone calls made to those who did not respond to the second e-mail within 6 weeks of the initial survey. The same questions were included on the faxes or asked during the phone call as were used in the e-mailed version of the survey instrument.

Data were summarized, collated, and analyzed using Microsoft Excel and SPSS.

RESULTS

Of the 90 colleges and schools contacted initially by phone, 7 did not currently have someone teaching pharmacoeconomics (eg, they were looking for an instructor or were a new school). Therefore, survey instruments were e-mailed to 83 instructors who taught pharmacoeconomics. After follow-up survey instruments were sent,

data were collected on all 83 colleges and schools with regard to the first 3 items: (1) required and/or elective, (2) number of hours, and (3) number of students. Information on topics and resources (questions 4 and 5) were collected from 67 (81%) colleges and schools.

Among the 83 colleges and schools that had an instructor who taught pharmacoeconomics, 69 covered pharmacoeconomic topics in a required course only, 5 covered pharmacoeconomic topics in an elective course only, and 9 covered these topics in both a required and elective course. Responses to questions 2 and 3 are therefore summarized for 78 required courses (69 + 9) and 14 elective courses (5 + 9).

The average number of required hours offered by the 78 colleges and schools was 21 (range 1 - 48; SD = 14; median = 19). The average number of elective hours offered by 14 colleges and schools was 31 hours (range 4 - 48; SD = 15; median = 30; Table 1). Figures 1 and 2 show that the number of required hours followed a normal distribution, while the distribution of the number of elective classroom hours was negatively skewed. The majority, 8 of 14 colleges and schools, with elective courses provided 30 or more hours of pharmacoeconomic-related topics.

The average number of students in the required courses (n = 78) was 124 students (range 45-300; SD = 57; median = 115). In the elective courses (N = 14), the number of students ranged from 5 to 85 with a mean of 19 (SD = 22; median = 10; Table 2). Figures 3 and 4 show that the number of students enrolled in required courses followed a normal distribution, while the distribution of the number of students in an elective course was positively skewed. If a course was required, all pharmacy students in that college would be enrolled, and the number of pharmacy students for US colleges of pharmacy is normally distributed. In contrast, some elective courses had as few as 5 students enrolled.

Of the 83 instructors who responded, 67 provided a list of pharmacoeconomic-related topics covered in their curriculum. These were categorized by the authors.

Table 1. Pharmacoeconomics Education Course Hours Offered at US Colleges of Pharmacy in 2007

Summary Statistics	Required Hours (N = 78)*	Elective Hours (N = 14)*
Average (SD)	21 (14)	31 (15)
Median	19	30
Minimum	1	4
Maximum	48	48

*The sum of the number of colleges and schools teaching required and elective courses is greater than 83, because 9 colleges and schools offer both required and elective hours

Figure 1. Classroom hours for pharmacoeconomics-related topics in required courses (n = 78).

Table 3 shows the most commonly listed topics. The most universally covered topics included: types of pharmacoeconomics studies (n = 65; 97%), article/research evaluation (n = 65; 67%), decision analysis (n = 45; 67%) and

Figure 2. Classroom hours for pharmacoeconomics-related topics in elective courses (n = 14)

Table 2. Students Receiving Pharmacoeconomics Education at US Colleges of Pharmacy in 2007

Summary Statistics	Students in Required Course (N=78)*	Students in Elective Course (N=14)*
Average (SD)	124 (57)	19 (22)
Median	115	10
Minimum	45	5
Maximum	300	85

*The sum of the number of colleges and schools teaching required and elective courses is greater than 83, because 9 colleges and schools offer both required and elective hours

health-related quality of life (n = 41; 61%; Table 3). Of the 67 colleges and schools that responded to the question about resources (books or articles) used in their course, the most common textbooks that were required or recommended for their course were: Bootman, Townsend and McGhan's *Principles of Pharmacoeconomics*, third edition¹³ (n = 19, 28%); Grauer, Lee, and Odom's *Pharmacoeconomics and Outcomes: Applications for Patient Care*, second edition¹⁴ (n = 11, 16%); Drummond, Sculpher, and Torrance's *Methods for the Economic Evaluation of Health Care Programmes*, third edition¹⁵ (n = 8, 12%).

Although 46 articles on pharmacoeconomic-related topics (excluding case studies/articles for evaluation) were listed as being used in the courses, no article was listed for more than 1 school. A complete list of these 46

Figure 3. Number of students in required courses with pharmacoeconomics-related topics (N = 78).

Figure 4. Number of students in elective courses with pharmacoeconomics-related topics (N = 14).

articles is available from the authors on request. These articles were also incorporated into the ISPOR Educators' Toolkit web site.⁹

Comparisons With Previous Survey Results

Comparisons of the 2 surveys are summarized in Table 4. During the 1996-1997 academic year, about 80%

Table 3. Pharmacoeconomics Topics Listed by at Least 10 of 67 Respondents

Topic	Respondents, No.
Types of Studies (eg, CEA, CBA, CUA, CMA)	65
Article/research evaluation	45
Decision analysis	45
Health-related quality of life	41
Outcomes research/ECHO model	30
Applications of pharmacoeconomics (hospital, industry, etc)	28
Costs: types of costs, adjustments, discounting, inflation	26
Sensitivity/threshold analysis	22
Cost of illness/burden of illness	18
Calculations (eg, ICERs)	15
Formularies/budget impact	14
Health care economics, micro-economics	11
Research design/methods	11
Epidemiology/population studies	11
Markov modelling	10

Table 4. Comparison of Studies That Assessed the Extent of Pharmacoeconomics Education at the Professional Level in the United States

Variables	1996-1997 ^a	2007
Number of accredited pharmacy colleges and schools in the US	79	90
Number colleges and schools responding	79	90
Response rate, %	100	100
Number of colleges and schools teaching pharmacoeconomics, No. (%)	63 (80)	83 (92)
Type of Course ^b		
Required		
BS	22	
PharmD	48	69
Elective		
BS	6	
PharmD	4	5
Both required and elective courses		
PharmD	5	9
Median number of clock hours devoted to pharmacoeconomics		
BS	8	
PharmD	16	
Required		19
Elective		30
Median number of students receiving the course		
BS	90	
PharmD	65	
Required		115
Elective		10

^aRascati KL, Conner TM, Draugalis JR. Pharmacoeconomics education in US colleges and schools of pharmacy. *Am J Pharm Educ.* 1998;62:167-9

^bFor the 1996-1997 study, the totals for required, elective, and both equal more than 63 colleges and schools because some colleges and schools had both BS and PharmD students at the same time and provided pharmacoeconomics education to both levels

(63 of 79) of US pharmacy colleges and schools offered pharmacoeconomic-related education at the professional level.¹⁰ In this 2007 survey, 83 of 90 colleges and schools (92%) offered this type of education. Direct comparisons of other findings are complicated because of the way the data were summarized. In the previous survey, data were summarized by type of professional student, BS versus PharmD. Some colleges and schools had both BS and PharmD students enrolled during the 1996-1997 academic year, while offering pharmacoeconomic-related topics in both elective and required courses. The mean

and median number of clock hours and students was not reported based on elective versus required courses, but based on the number of students enrolled as PharmD versus BS students. Even though direct comparisons are limited, the median number of clock hours for both required (median = 19 hours) and elective (median = 30 hours) courses are higher than the 1996-1997 values¹⁰ for BS pharmacy students (median = 8 hours) and PharmD students (median = 16 hours).

DISCUSSION

Results from this update survey show that a higher percentage of accredited colleges and schools of pharmacy in the United States (92%; 83 of 90) offered pharmacoeconomics education at the professional level compared with 10 years ago (80%; 63 of 79). In addition, the colleges and schools that did not offer this topic were "between instructors" or were too new to have a specific instructor for these topics named yet. Although the median number of hours devoted to pharmacoeconomic-related topics increased over the 10-year period, some colleges and schools were still providing few hours (15 colleges and schools had less than 5 hours on these topics). It is difficult to determine whether each school included the topics listed in the ACPE guidelines, although health-related quality of life topics were specifically listed by ACPE, and 61% (41 of 67) of colleges and schools listed that topic.

Limitations

Results from this e-mailed survey should be interpreted with caution. A short survey instrument was used to improve the response rate (100%), but not all questions concerning pharmacoeconomics education were included (eg, what method of evaluation is used to assess student's knowledge). In an open-ended question, respondents were asked to list (or copy and paste from their syllabus) the topics covered in the courses, and the authors later used their judgement to classify these topics. If instructors had been given a list of topics to choose from (ie, a closed-ended question), it is possible that some topics would have been coded differently.

CONCLUSIONS

Future pharmacists should have a basic understanding of pharmacoeconomics. ACPE guidelines list pharmacoeconomic-related topics that should be covered in the PharmD curriculum beginning July 2007. This survey, conducted in the first half of 2007, showed that at least 1 hour and as much as 48 hours related to this topic were currently offered at most (92%) US colleges of pharmacy. This is an increase compared to the 1996-1997 survey. Recommendations for the minimum number of hours

needed to cover basic aspects of pharmacoeconomics and a more precise delineation of what basic topics include should be considered.

ACKNOWLEDGMENTS

The authors thank the professors from the participating colleges of pharmacy in the United States. The authors also thank Tara Penny, a PharmD student at the College of Pharmacy at The University of Texas at Austin, who made the original phone calls.

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