

Evaluation of Teaching Pharmacoeconomics to Japanese Students

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ABSTRACT. This study's purpose was to teach a pharmacoeconomics elective course and determine whether Japanese pharmacy students understood basic pharmacoeconomic concepts and evaluate their attitudes about the topic. This study found students understood the importance of knowing costs and consequences of drug therapy alternatives. Students had a reduction in apprehension about pharmacoeconomics at the end of the course and they felt the topic would be important to their government and pharmaceutical industry. Pharmacoeconomics should be required course material within Japanese schools of pharmacy. Foreign language teaching difficulties and the importance of tangible examples are discussed. [Article copies available from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: getinfo@haworth.com]

INTRODUCTION

Pharmacoeconomics is gaining considerable attention within today's health-care system (1,2,3,4). Payers want to know what

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they are purchasing with their health-care dollars and the pharmaceutical industry is interested in measuring the range of outcomes from their products (5,6,7,8). Clinicians and pharmacists are interested in using these techniques to determine therapeutic agents for inclusion on medication formularies, managing patients, and for developing treatment guidelines (9,10,11,12). Disease-state management programs are expanding by evaluating the costs and outcomes of comparative treatment alternatives (13,14).

Pharmacoeconomic issues (such as cost-effectiveness analysis, quality of life, and cost-benefit analysis) are also being raised more frequently in drug advertising within professional journals (15). Pharmacoeconomics is playing a larger role as pharmacists gain additional responsibility in selecting drug products and being primary drug-therapy decision-makers.

Practitioners must be trained to perform pharmacoeconomic analysis in a competent manner. Draugalis and Jones-Grizzle (16) have provided suggestions for incorporating pharmacoeconomics into existing pharmacy curricula. Juergens et al. (17) conducted a mail questionnaire to all pharmacy schools in the United States and Puerto Rico to determine the pharmacoeconomic curricular content in B.S. and Pharm.D. programs. He found that pharmacoeconomic techniques were required in 19.3% and elective in 22.2% of B.S. programs. He also found that pharmacoeconomic techniques were required in 32.8% and elective in 36.1% of Pharm.D. programs. It is important to note that basic concepts of cost-benefit, cost-effectiveness, and cost-utility analysis were not available to students in 31.1% of Pharm.D. programs and over half (58.5%) of B.S. programs. Although this is an improvement from a previous study, a large number of U.S. students are still not exposed to pharmacoeconomic concepts (18).

No similar study has been conducted within Japanese schools of pharmacy. It is known that there are significant differences between Japanese and American pharmacy curricula. Japanese systems strongly emphasize basic sciences, traditional lectures, and a product-oriented focus (19). Frequently, Japanese pharmacy faculty members have no pharmacy practice experience. Courses are usually taught in formal lectures and questions from Japanese students to instructors (authority figures) are uncommon. Pharmacy courses

primarily emphasize tangible examples of pharmacy products and infrequently discuss simulations or theoretical issues such as the "different perspectives of health-care costs" or "how side effects can be costs."

In addition to the curricular differences between Japan and America, there are also large practice differences. In Japan, drug product dispensing occurs much more commonly by physicians than by community pharmacies (20,21,22). The pharmaceutical industry hires 40 to 50 percent of Japanese pharmacy graduates and women pharmacists have historically worked primarily in hospitals (23,24).

The Japanese pharmacy curricula is established by the Ministry of Health and Welfare as a four-year B.S. program. There are no Pharm.D. programs in the country, although there is discussion about expanding to some type of six-year, entry-level pharmacy degree. Gourley *et al.* (25) recently found that Japanese hospital pharmacists believe that future institutional pharmacy and medicine practices will move toward a more "team approach" in managing drug therapy. Nevertheless, these pharmacists did not believe there would be significant changes in pharmacy education requirements by the year 2010. However, the Japanese Review Committee for the National Pharmacy Board Examination recently stated that the examination will change in 1995 to a pharmacy practice emphasis for the majority of the examination (26). The examination will stress clinical pharmacy issues and for the first time include a section on health-care economics.

To the authors' knowledge, no school of pharmacy in Japan presently includes any pharmacoeconomic-related topics in their curricula and only two Universities (Kobe Gakuin University and Nippon University) have a pharmacy administration laboratory (27). The purpose of this study was to determine whether Japanese pharmacy students understood basic pharmacoeconomic concepts before and after a supplementary elective course and to evaluate their attitudes about pharmacoeconomics. In addition, since American pharmacy literature contains very limited information concerning Japanese curricula, unique Japanese cultural characteristics and difficulties teaching in a foreign language were also addressed.

METHODS

An elective pharmacoeconomic course was developed by a foreign visiting professor from the United States at a private Japanese university school of pharmacy. The course was designed for pharmacy students in their fourth year of college, the last year in the B.S. program at Kobe Gakuin University. The Faculty of Pharmaceutical Sciences offers three specialty programs (marketing, hospital practice, and research). All fourth-year pharmacy students select one of these programs. In 1994, there were 191 fourth-year students. Thirty-five students selected the marketing program. In addition, all fourth-year students are required to work in a faculty research laboratory (such as pharmacy administration, pharmaceuticals, pharmacology, or physiological chemistry). All available pharmacy administration laboratory students (10 of 11, one was unavailable due to off-campus training) and nine of 35 marketing program students chose to attend the elective pharmacoeconomic course. As these students were oriented to pharmacy administration and marketing (determined by their choice of specialty program and laboratory), the course attendees were representative of these two groups of pharmacy students. The course was provided as nine 90-minute lectures over a two-week period. The lectures were provided in English and translated into Japanese by a bilingual pharmacy administration faculty member. Although many Japanese pharmacy students can read basic English, most have difficulty listening to or speaking English. At the beginning of the first class period, students were given a pre-test on pharmacoeconomics (see Appendix A). The questionnaire was divided into three parts. The first section was composed of 14 items about pharmacoeconomic topics, the second section was 10 items concerning attitudes and opinions about pharmacoeconomics, and the third section discussed career options and respondent gender. The pre-test was written in English and translated into Japanese by the bilingual faculty member.

The lectures were conducted with 35 mm. slides and the students each received a handout printed by PowerPoint version 3.0 (Microsoft, Redmond, WA) that listed each slide item word-for-word. Lectures were provided by stating a phrase in English and then having the phrase translated into Japanese. The course was divided

into four lectures on basic principles of pharmacoeconomics, two lectures on quality-of-life issues, two lectures on evaluating pharmacoeconomic literature, and one lecture on drug use evaluation. Following completion of the topics, students completed a post-test, which was the same as the pre-test. Students were not told before the post-test was given that they would be asked questions about the material.

RESULTS

All nineteen students completed the pre- and post-tests. Descriptive statistics were used to summarize the results due to low number of students enrolled in the supplementary elective course. Figures 1 and 2 summarize the study results.

Pharmacoeconomic Knowledge

Out of 14 possible points, the average score on the pre-test was 5.4 ± 2.0 (38.6%); the average score on the post-test was 7.5 ± 2.7 (53.6%). On the pre-test, the highest number of correct answers among Japanese students related to knowing the importance of study perspective influencing costs and consequences (16/19, 84% correct) and knowing that direct costs were the easiest to measure (16/19, 84% correct). Pre-test scores were weakest among students related to knowing the definition of cost-effectiveness analysis (1/19, 5.2% correct), the definition of indirect costs (3/19, 15.7% correct), the definition of cost-utility analysis (3/19, 15.7% correct), and why a sensitivity analysis should be done (3/19, 15.7% correct).

Post-test scores demonstrated that Japanese students were strongest in knowing pharmacoeconomics includes a study of both medication costs and consequences or outcomes (19/19, 100% correct), knowing that costs and consequences must be suitable for the study perspective (18/19, 95% correct), knowing direct costs were easiest to measure (17/19, 89% correct), and knowing that pharmacoeconomic studies should include all relevant treatment options (16/19, 84% correct). Post-test scores were weakest in distinguishing that a cost-minimization example was not a true cost-effective-

FIGURE 1. Post-Test Attitudes About Pharmacoeconomics.

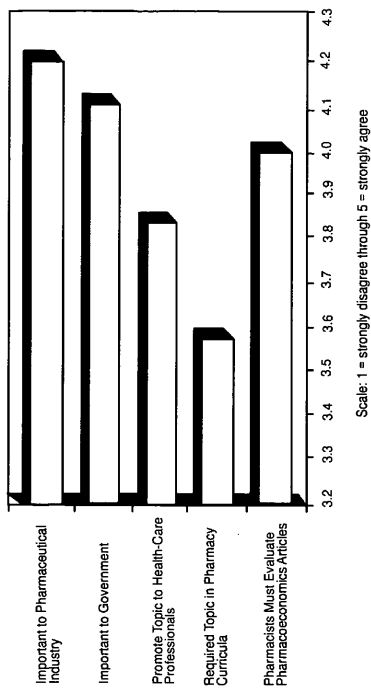
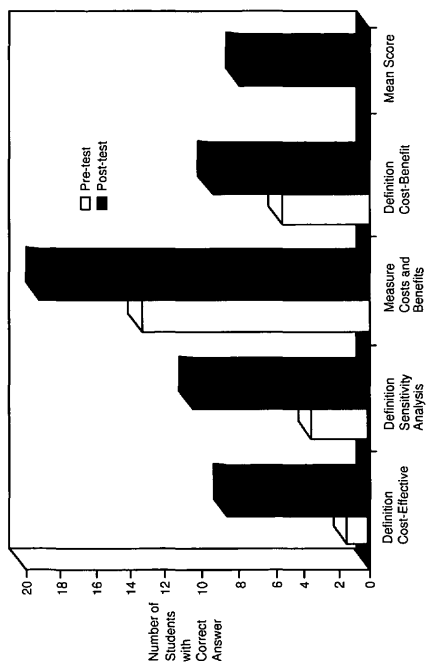


FIGURE 2. Areas of Greatest Improvement and Change in Overall Mean Score.



ness analysis (4/19, 21% correct), knowing the definition of cost-minimization analysis (4/19, 21% correct), and knowing the definition of a pharmacoeconomic study perspective (6/19, 32% correct).

In comparison of pre- and post-test scores, the greatest improvement was seen in knowing the definition of cost-effectiveness analysis (seven additional correct responses), knowing the definition of sensitivity analysis (seven additional correct responses), and knowing that pharmacoeconomics includes a study of both medication costs and consequences (six additional correct responses). There was one fewer correct score on the post-test than pre-test in knowing that monitoring costs during clinical trials may be more extensive than those seen during clinical practice. There was no improvement between pre- and post-test scores for knowing that a cost-minimization example was not a true cost-effectiveness analysis and for knowing the definition of incremental cost.

Attitudes About Pharmacoeconomics

Respondents answered the ten items using a five-point scale ranging from 1 = strongly disagree to 5 = strongly agree. The highest pre-test response was that pharmacoeconomics was a completely new topic for the students (4.5 ± 0.8 , mean \pm standard deviation). Pre-test responses also indicated that Japanese students felt pharmacists needed to know how to evaluate and interpret pharmacoeconomic journal articles (4.2 ± 0.6) and that pharmacoeconomics will be considered important by the Japanese pharmaceutical industry in the future (4.0 ± 0.9). In addition, pre-test responses indicated that some students felt apprehensive when they thought about using pharmacoeconomic principles (2.9 ± 1.0).

The post-test indicated that Japanese students felt pharmacoeconomics will be considered important in the future by both the Japanese pharmaceutical industry (4.2 ± 0.5) and by the Japanese government (4.1 ± 0.6). The post-test demonstrated that there were fewer students that felt apprehensive when they thought about using pharmacoeconomic principles (2.8 ± 1.0 on pre-test and 2.4 ± 0.8 on post-test). Students also felt there was a need to promote pharmacoeconomics to health-care professionals (3.8 ± 0.7). In addition, Japanese students felt that pharmacoeconomics should be a

required topic for all pharmacy students (3.6 ± 0.6). However, there was a slight decrease on the post-test in agreeing that pharmacists need to know how to evaluate and interpret pharmacoeconomic journal articles (4.2 ± 0.6 on pre-test and 4.0 ± 0.9 on post-test).

Demographic Information

Students were asked what type of professional career they were planning by selecting a career as outlined by the Japan Society of Hospital Pharmacists (24). Nine students planned to work in the sale, importation, or manufacturing of pharmaceuticals, two planned to be community pharmacy owners, two planned to be community pharmacy employees, two planned to be hospital or clinic employees engaged in preparing medicines, one planned to be a hospital or clinic employee engaged in clinical or hygienic tests, one planned to work in public health service (hygienic administration), one planned to work in the wholesaling of pharmaceuticals, and one planned to teach or conduct research at a university. Eleven females and eight males completed the elective course.

DISCUSSION

This study describes the original experience of teaching pharmacoeconomics to Japanese pharmacy students. The low pre-test score was not surprising since the topic was so new. Students improved their average score to 7.5 ± 2.7 (53.6%) without any preparation. No other studies with students from other countries are available for comparison. If students had known they would be tested and reviewed their material, post-test scores would likely have been much higher.

Japanese elective courses are not required for graduation. Elective courses are completely voluntary and are supplementary work for students. Students are aware that elective course grading is typically established by attendance and do not anticipate a need to review course material. In addition, the voluntary nature of elective courses most likely explains the low number of students attending the course.

In conducting the course, some obstacles appeared to be cultural barriers and total newness of the topic. Moreover, Japanese pharmacy students stated they were not used to thinking about simulations and theoretical issues. It was a major leap for students to think about cost simulations and health-care system impacts from drug therapy consequences. A major initial discussion topic was explaining how a side effect could be a health-care cost. Students understood that side effects could lead to noncompliance, but it was difficult for them to understand that treatment of side effects (such as physician visits, additional drugs, and hospitalizations) were costs related to the drug. Pharmacoeconomic and clinical implications of drug therapy are a major departure from the Japanese medicinal chemistry, product-oriented course work.

Although many Japanese pharmacy students can read basic English, having the primary instructor speak a different language from the students created communication difficulties. The communication impairments were reduced by using very complete slides and giving students handouts with word-for-word statements from the presentation (since students could read many of the words). In addition, the verbal Japanese translation was prepared ahead of time and attempted to clarify many issues during lectures. Table 1 identifies obstacles in teaching a pharmacoeconomic course to Japanese pharmacy students.

Cultural factors also impacted course instruction techniques. An important Japanese cultural characteristic is respect for authority.

TABLE 1. Unique Aspects of Japanese Pharmacoeconomics Course

Communication difficulties (verbal and written) with English-speaking instructor
Pharmacy administration courses are uncommon
Pharmacoeconomics is a completely new topic
Japan and the United States have quite different health-care systems
Elective courses are voluntary
Students are weak in simulation-oriented topics
Infrequent questions from students
Minimal classroom discussion during lectures

Because professors are held in high regard within the classroom, Japanese students rarely question a professor. Furthermore, many Japanese tend to be reserved or shy by Western standards. It is culturally uncommon for Japanese students to respond to questions posed during lectures. Students called on by name were particularly uncomfortable responding verbally in class. With the cultural difficulty in obtaining feedback, it was difficult for instructors to know whether material was being fully understood.

Problem-based learning approaches or student-led discussions may be effective to improve problem-solving skills in many courses. However, the elective nature of this course, in addition to their other student course work, would likely minimize student preparation. Although encouraged to ask questions, generating discussion among students during class was difficult.

It was also difficult for Japanese students to understand a different health-care system, such as that found within the United States. Japan does not have managed-care organizations and currently the Japanese government and insurance organizations function through fee-for-service mechanisms. Japanese students were unfamiliar with capitated payment concepts, bundled fees, prior authorization, and other health-care approaches commonly encountered within the United States.

Pre-test topics students knew best (measuring costs and consequences and direct costs being easiest to measure) may have been good educated-guessing since the topics had not been covered within their curriculum. Students not understanding the question concerning clinical trials may have been due to a lack of familiarity with clinical trial protocols. Although the definition of cost-effectiveness versus cost-minimization was stressed in lectures, this was still a difficult concept for Japanese students to grasp. Additional examples may have helped clarify this issue and identified why common use of the term "cost-effective" is often merely cost-minimization. The lectures primarily discussed incremental cost between therapeutic options and did not emphasize marginal cost. On the post-test, students may have recognized the description of incremental cost, but had difficulty recognizing that it was not called marginal cost.

Although Japanese students had difficulty separating cost-mini-

mization from cost-effectiveness, it was encouraging to see the improvement in recognizing the definition of cost-effectiveness analysis. It was also important for students to understand the value of a sensitivity analysis and the impact of assumptions used in cost-benefit calculations.

It is interesting to note that there was a slight reduction in students' agreement that pharmacists needed to know how to evaluate pharmacoeconomic journal articles. This may be due to the lack of pharmacoeconomic data within the Japanese literature, a basic science focus of Japanese curricula, or career opportunities of most Japanese pharmacy students.

The demographic data confirmed the large percentage of Japanese students planning to work within the pharmaceutical industry. Since these companies are quite interested in pharmacoeconomic implications of drug therapy, it appears understanding these basic principles is particularly important for Japanese students.

An important limitation to this study was the phrase-for-phrase translation teaching method. A native Japanese instructor would likely have been easier for the students to understand and may have allowed students to be more confident asking questions. In addition, it is important to note that the students attending the course were self-selected. Therefore, these results may not be generalizable to other Japanese pharmacy students. Because of the cultural and curricular differences, there is no attempt to generalize these results to American pharmacy students.

Also, the elective nature of the course may have minimized student attentiveness. The small sample size is acknowledged. A more thorough testing procedure may have identified additional student strengths and weaknesses in these concepts and additional attitudes toward the topic. Because the pre- and post-tests were identical, retesting may have contributed to an increase in post-test responses.

CONCLUSION

This study summarizes the original experience teaching pharmacoeconomics as a course within a Japanese school of pharmacy. Based on this experience, we draw the following conclusions:

- Japanese students understood the importance of knowing the costs and consequences of drug therapy alternatives.
- Japanese students felt pharmacoeconomics will be important to their government and pharmaceutical industry in the future.
- Japanese students thought pharmacoeconomic principles should be promoted to other health professionals.
- There was a reduction in apprehension about pharmacoeconomics at the end of the course.
- An improvement in student understanding of pharmacoeconomics was achieved through an elective course, despite elective courses restrictions and communication difficulties.
- Based on our findings, it is proposed that pharmacoeconomics should be required course material within all schools of pharmacy in Japan.
- There are important cultural differences in Japan that impact the ability to have discussions within the classroom.
- Japanese students are weak in simulation-oriented topics; multiple, tangible examples are important for instruction.
- Phrase-by-phrase translation is not an optimal instruction method.

It is hoped this study will encourage the further expansion of instruction in pharmacoeconomics within other Japanese schools of pharmacy. In addition, other countries currently not offering pharmacoeconomics within their curricula are encouraged to consider its inclusion as well.

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APPENDIX A

Pharmacoeconomic Analysis (English version)

1. Pharmacoeconomics is the study of medication treatment costs, but does NOT consider the consequences (or outcomes) of treatments
 - a. True
 - b. False
 - c. I do not know
2. A study that compares the *cost of therapy* between two different medications that treat high blood cholesterol levels is described as a *cost-effective* analysis
 - a. True
 - b. False
 - c. I do not know
3. Analysis of *treatment alternatives* in pharmacoeconomic studies
 - a. should never include a “no treatment” or “do nothing” option
 - b. does not need to include the current standard of care
 - c. should include all relevant treatment options
 - d. will not include surgical treatment options
 - e. I do not know
4. Analysis of pharmacoeconomics *study perspective* is
 - a. the “viewpoint” of a study for determining costs and consequences
 - b. a cost-effective study
 - c. the inclusion of quality-of-life data
 - d. to be sure all relevant alternatives are analyzed
 - e. I do not know

5. It is important to determine if the *costs and consequences* of a pharmacoeconomic study are suitable for the *study perspective*
 - a. True
 - b. False
 - c. I do not know
6. *Indirect costs* include which of the following:
 - a. Medication cost to treat the disease
 - b. Physician cost to treat the disease
 - c. Time missed from work due to illness
 - d. Cost of additional medication used to treat side effects from the initial medication
 - e. I do not know
7. Which of the following are *easiest* to measure:
 - a. Direct costs
 - b. Indirect costs
 - c. Intangible costs
 - d. Pain and suffering costs
 - e. I do not know
8. Analysis of outcomes by demonstrating "*equal benefits*" is used in which type of pharmacoeconomic analysis?
 - a. Cost-minimization analysis
 - b. Cost-effective analysis
 - c. Cost-utility analysis
 - d. Cost-benefit analysis
 - e. I do not know
9. Analysis of outcome in terms of "*natural*" or "*physical*" units (e.g., the number of lives saved, years of life saved, or the number of seizure-free months) is used in which type of pharmacoeconomic analysis?
 - a. Cost-minimization analysis
 - b. Cost-effective analysis
 - c. Cost-utility analysis
 - d. Cost-benefit analysis
 - e. I do not know

10. Incorporation of *quality of life* (e.g., determining quality adjusted life years) is used in which type of pharmacoeconomic analysis?
- Cost-minimization analysis
 - Costs-effective analysis
 - Cost-utility analysis
 - Cost-benefit analysis
 - I do not know
11. Incorporation of *benefits in monetary terms* is used in which type of pharmacoeconomic analysis?
- Cost-minimization analysis
 - Cost-effective analysis
 - Cost-utility analysis
 - Cost-benefit analysis
 - I do not know
12. Costs of treatment during a clinical trial may include *monitoring costs* that are *more extensive* than seen in normal clinical practice.
- True
 - False
 - I do not know
13. The *marginal cost* of a treatment is the other way the money could be spent if it was not spent on the treatment (i.e., paying for a more extensive vaccination program rather than paying for a heart transplant).
- True
 - False
 - I do not know
14. *Sensitivity analysis* is done in pharmacoeconomic studies to determine whether the probability of finding a difference is due to chance alone.
- True
 - False
 - I do not know

Please use the scale below to answer the following questions:

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

15. Pharmacoeconomics is a *completely* new topic for me.

1 2 3 4 5

16. I become *apprehensive* when I think about using pharmacoeconomic principles.

1 2 3 4 5

17. Pharmacoeconomics is *too complicated* for me.

1 2 3 4 5

18. Pharmacists need to know how to *evaluate and interpret* pharmacoeconomic journal articles.

1 2 3 4 5

19. In the future, pharmacoeconomics should be a *required topic* for all pharmacy students

1 2 3 4 5

20. I see a great need for promoting pharmacoeconomics to *healthcare professionals*

1 2 3 4 5

21. Pharmacoeconomics is considered important by the Japanese government *today*

1 2 3 4 5

22. Pharmacoeconomics will be considered important by the Japanese government in the *future*

1 2 3 4 5

23. Pharmacoeconomics is considered important by the Japanese pharmaceutical industry *today*

1 2 3 4 5

24. Pharmacoeconomics will be considered important by the Japanese pharmaceutical industry in the *future*

1 2 3 4 5

Demographic information

25. What type of professional career are you planning for yourself?

- a. Pharmacy owner
- b. Pharmacy employee
- c. Hospital or clinic employee engaged in preparing medicine
- d. Hospital or clinic employee engaged in clinical or hygienic tests
- e. Pharmacist who teaches or does research at a university
- f. Pharmacist engaged in hygienic administration or public health service
- g. Pharmacist engaged in manufacturing or import sales of pharmaceutical goods
- h. Pharmacist engaged in retail sale of pharmaceutical goods
- i. Other occupations

26. What is your gender?

- a. Male
- b. Female

27. What is your identification number?
-