

9/18/07

PHG 537

Pharmacoeconomics, Genetics, and Healthcare

**Wednesdays, 9-11:50 AM
Autumn 2007**

**David L. Veenstra, PharmD, PhD
Louis P. Garrison, PhD**

Instructors:

David L. Veenstra, PharmD, PhD – HSB H375-J
Associate Professor
Pharmaceutical Outcomes Research and Policy Program
Department of Pharmacy
Phone: 221-6936
Fax: 543-3835
E-mail: veenstra@u.washington.edu

Louis P. Garrison, PhD - HSB H375
Professor
Pharmaceutical Outcomes Research and Policy Program
Department of Pharmacy
Phone: 221-5684
Fax: 543-3835
E-mail: lgarrisn@u.washington.edu

Office Hours:

By appointment

Course objectives:

After this course, the student will be able to:

- Compare and contrast the different methods for economic evaluation in health care;
- Describe the instruments for measuring health state preferences;
- Evaluate a simple decision analysis model;
- Identify the role of economic evaluation in decision making and health policy;
- Critically evaluate a published cost-effectiveness study;
- Apply economic evaluation and health technology assessment to genetic tests

General description of the course

This is an introductory course in economic evaluation in healthcare offered jointly by the School of Pharmacy’s Pharmaceutical Outcomes Research and Policy Program (<http://depts.washington.edu/porpp/>) and the School of Public Health’s Institute for Public Health Genetics (<http://depts.washington.edu/phgen/>). Attention is focused on cost-effectiveness and cost-benefit analysis, measures of health-related quality of life, technology assessment, resource allocation, pharmacoeconomics, and medical decision-making. We will also cover issues related to genomics, including cost-effectiveness of genetic testing and screening, and insurance and employment issues related to genetic information.

This class is ‘withered’ (taught along with) PHARM534/HSERV583, which covers the same material but requires a research project. References to the course project below do not apply to students taking PHG537. However, PHG537 students are expected to attend all presentations of the projects, and fully participate in discussion of them.

GRADING:

All assigned work will be graded on a 5-point scale for excellent (5) to poor (1) and reviewed by both instructors. Grading will be based on classroom participation, a midterm exam, and a written critique of a published cost-effectiveness paper.

| | |
|---------------------------------------|-----|
| Classroom participation | 25% |
| Midterm exam | 25% |
| Written critique of a published paper | 50% |

Grading will be based on student performance using the grading system for undergraduate and graduate students published in the 2002-2004 University of Washington General Catalog.

Readings

The following required textbooks can be purchased at the South Campus University Bookstore:

Required:

Petitti D. Meta-Analysis, Decision-Analysis, and Cost-Effectiveness Analysis. 2nd edition. Oxford University Press 2000.

Gold, Siegel, Russell, Weinstein. Cost-Effectiveness in Health and Medicine. Oxford University Press 1996.

Recommended:

Drummond, M.F., Sculpher M.J., Torrance, G.W, O'Brien, B.O., Stoddart, G.L., Methods for the Economic Evaluation of Health Care Programmes. 3rd Edition. New York: Oxford University Press, 2005.

EVALUATING COST AND OUTCOMES IN HEALTH AND MEDICINE

OUTLINE

1. September 26 Course Introduction. Overview and Rationale for Economic Evaluation in Healthcare and Theoretical Foundations
Veenstra & Garrison
2. October 3 Methods for Economic Evaluation. CEA/CUA/CBA and Resource Allocation
Garrison
3. 10 Framing Studies and Decision Analysis, Class Modeling Exercise
Veenstra
4. 17 Numerator: Identification and Measurement of Resource Utilization, Non-Medical Resources and Unit Cost Determination
Garrison **Midterm Distributed**
5. 24 Denominator: Methods for Preference Elicitation and QALY Determination, Class Exercise **Midterm Due**
Beth Devine
6. 31 **Student Project Updates** (3-5 min each, no slides, total 1 hour)
Journal of Cost and Outcomes Research: Editorial Board Meeting (40 min. each, 3 groups – 3 manuscripts)
Garrison & Veenstra
7. November 7 Markov Modeling, Uncertainty Simulations, and Discrete Event Simulation
Veenstra
8. 14 Cost-effectiveness trials; Economic issues and genetics
Veenstra and Garrison
9. 21 Resource Allocation Decisions in the Real World
Sean Sullivan
10. 28 Student Project Presentations
Veenstra & Garrison
11. December 5 Student Project Presentations
Veenstra & Garrison
Project Paper Due beginning of class

SESSION #1

September 26

INTRODUCTION TO ECONOMIC EVALUATION IN HEALTHCARE

Garrison & Veenstra

Objectives for this Session - After this session, students will be able to:

1. Define economic evaluation and its potential applications in healthcare
2. Identify how expected utility theory and social welfare theory provides a theoretical basis for economic evaluation methods;
3. Discuss the theoretical origins of preference-based measures of health status and quality of life.

Topics:

1. Discuss course content and guidelines for student assessment, review student project topics
2. Relevance and role economic evaluation in health and medicine
3. Decision making under uncertainty
4. Theoretical foundations of cost-effectiveness analysis.
5. Welfare economics and QALY maximization as a basis for social policy
6. The importance of perspective
7. Time costs, preference, and future costs
8. Theories of positive well-being and quality of life

Required Readings:

1. Russell L et al. Cost-effectiveness analysis as a guide to resource allocation in health. Roles and Limitations. Chapter 1 in Gold MR, et al. Eds. Cost-Effectiveness in Health and Medicine 1997 Oxford University Press. **[Core text]**
2. Garber AM, Weinstein MC, Torrance G, Kamlet MS. Theoretical foundations of cost-effectiveness analysis. Chapter 2 (pp.25-50) in Gold MR, et al. Eds. Cost-Effectiveness in Health and Medicine 1997 Oxford University Press. **[Core text]**

Suggested Readings:

3. Donaldson et al. Cost-effectiveness analysis in health care: contraindications. BMJ 2002;325(7369):891-4.**[HealthLinks]**
4. **Chapter 1**, Drummond, M.F., Sculpher M.J., Torrance, G.W, O'Brien, B.O., Stoddart, G.L.,. Methods for the Economic Evaluation of Health Care Programmes. 3rd Edition. New York: Oxford University Press, 2005.

SESSION #2

October 3
**METHODS FOR ECONOMIC EVALUATION: CEA/CUA/CBA
AND RESOURCE ALLOCATION**

Garrison

Objectives for this Session - After this session, student will be able to:

1. Describe the paradigm for classifying cost/outcomes studies;
2. Compare and contrast the various methods for economic evaluation of health care programs;
3. Define and interpret the incremental cost-effectiveness ratio (ICER).
4. Define and discuss the appropriate and inappropriate use of league tables, CE acceptability curves, and net benefits calculations;
5. What is the appropriate budget constraint?
6. Explain the results of cost/outcomes studies to health policy and other decision-makers.

Topics:

1. Designing cost-effectiveness studies for technology assessment
2. Specifying the incremental cost-effectiveness ratio
3. Interpreting the results of cost-effectiveness studies
4. Challenges to the use of cost benefit analysis in health care
5. Four quadrant cost/outcomes map
6. League tables and budget constraints
7. Cost-effectiveness acceptability curves
8. Net benefits
9. Decision rules for the results of economic evaluations
10. Current use of cost/outcomes data for decision-making
11. Evaluation of a hypothetical model

Required Readings:

1. Detsky AS, Naglie IG. A clinician's guide to cost-effectiveness analysis. *Ann Intern Med.* 1990 Jul 15;113(2):147-54. [Health Links]
2. Fenwick E, O'Brien BJ, Briggs A. Cost-effectiveness acceptability curves—facts, fallacies and frequently asked questions. *Health Economics.* 2004; 13: 405-415. [Health Links]
3. Mauskopf J, Rutten F, Schonfeld W. Cost-effectiveness league tables: valuable guidance for decision makers? *Pharmacoeconomics.* 2003;21(14):991-1000. [Health Links]

Suggested Readings:

4. Chapters 5, 6 and 7 in Drummond. [**Text book**]
5. Palmer S, Byford S, Raftery J. Economics notes: types of economic evaluation. *BMJ* 1999 15;318(7194):1349. [**Health Links**]

SESSION #3

October 10

FRAMING ECONOMIC EVALUATIONS AND DECISION ANALYSIS

Veenstra

Objectives for this Session - After this session, student will be able to:

1. Assess the policy context for a cost and outcomes study;
2. Define the objective for a cost and outcomes study;
3. Identify the audience and appropriate comparators;
4. Frame the study question using a decision analysis approach.
5. Define decision-analysis and interpret studies utilizing this methodology.
6. Place cost values within a clinical decision model.
7. Derive costs and outcome values using decision analysis software package

Topics:

1. Framing the study
2. Designing the study
3. Data sources
4. Building a decision tree
5. Informing a decision tree
6. Analyzing a decision tree
7. Sensitivity analysis
8. Class exercise
9. Antiseptic Catheter CEA Example

Required Readings:

1. Torrance GW et al. Framing and designing the cost-effectiveness analysis. Chapter 3 (pp.54-81) in Gold MR, et al. Eds. Cost-Effectiveness in Health and Medicine 1997 Oxford University Press. **[Core Text]**
2. Petitti DB. Meta-analysis, Decision Analysis, and Cost-effectiveness Analysis: Methods for Quantitative Synthesis in Medicine. New York, NY: Oxford University Press Inc; 1994. **Sections 2.2, 9.1 to 9.4, and Chapter 10 [Core Text]**

Suggested Readings [Particularly for those conducting modeling studies]:

1. Detsky AS, Naglie G, Krahn MD, et al. Primer on medical decision analysis: Part 1—Getting started. Medical Decision Making 1997;17 Iss 2:123-5. **[HealthLinks]**
2. Detsky AS, Naglie G, Krahn MD, et al. Primer on medical decision analysis: Part 2—Building a tree. Medical Decision Making 1997;17 Iss 2:126-35. **[HealthLinks]**
3. Naglie G, Krahn MD, Naimark D, et al. Primer on medical decision analysis: Part 3—Estimating probabilities and utilities. Medical Decision Making 1997;17 Iss 2:136-41. **[HealthLinks]**
4. Krahn MD, Naglie G, Naimark D, et al. Primer on medical decision analysis: Part 4—Analyzing the model and interpreting the results. Medical Decision Making 1997;17 Iss 2:142-51. **[HealthLinks]**

SESSION #4

October 17

NUMERATOR: MEDICAL RESOURCE UTILIZATION AND COSTS *Garrison*

****MIDTERM DISTRIBUTED AT END OF CLASS****

Objectives for this Session - After this session, student will be able to:

1. Differentiate between marginal and average costs, variable and fixed costs, incidence and prevalence-based costs, and direct medical and indirect nonmedical costs;
2. Explain the differences between actual costs, provider charges, and payer reimbursement;
3. Use a cost to charge ratio to adjust hospital billing records;
4. Design a cost-of-illness or cost-of-treatment study.

Topics:

1. The importance of definition of costs in economic evaluation: prices, costs, charges, reimbursements
2. Cost-of-illness methodology
3. Valuation of costs
 - a. Market-based valuation of direct and indirect costs
 - b. Non-market valuation of indirect costs
4. Adjusting prices
 - a. Time preference
 - b. Inflation and common year
5. Marginal and incremental costs
6. Allocating overhead

Required Readings:

1. Luce et al. Estimating Costs in Cost-Effectiveness analysis. Chapter 6 in Gold MR, et al. Eds. Cost-Effectiveness in Health and Medicine 1997 Oxford University Press. [**Core Text**]
2. Malone et al. Determining unit cost values for health care resources in pharmacoeconomic studies. Formulary 2001;36:294-304. [**HealthLinks**]

Suggested readings:

1. Chapter 4 in Drummond text. [**Text**]
2. Lipscomb et al. Time preference. Chapter 7 in Gold MR, et al. Eds. Cost-Effectiveness in Health and Medicine 1997 Oxford University Press. [**Core Text**]
3. Etzioni et al. Measuring costs: administrative claims data, clinical trials, and beyond. Med Care 2002;40(6):11163-72. [**HealthLinks**]
4. VA Health Economics Resource Center. <http://www.herc.research.med.va.gov/MicroPB.htm> [**WWW**]
5. Research Data Assistance Center (ResDAC) <http://www.resdac.umn.edu/Tools/TBs/TN-004a.pdf> [**WWW**]

SESSION #5

October 24

DENOMINATOR: METHODS FOR PREFERENCE ELICITATION AND QALY DETERMINATION

Beth Devine

****MIDTERM DUE AT BEGINNING OF CLASS****

Objectives for this Session - After this session, student will be able to:

1. Values and utility theory: gambles and trade-offs – von-Neumann/Morgenstern
2. Identify the types of outcome measures used in the denominator of cost-effectiveness analyses.
3. Describe quality-adjusted survival and disability-adjusted survival.
4. Define and describe methods for eliciting preference weights for QALY calculations.
5. Define and describe methods for willingness-to-pay estimation

Topics:

1. Concepts, domains, and indicators
2. QALYs and HYE
3. Instruments, indexes, profiles, and single measure valuations of utility
 - a. Multiattribute utility theory
 - b. Standard gamble
 - c. Time trade-off
 - d. Rating scales
4. Discounting benefits
5. Equity in the QALY measure: disability, age, and ethics
6. Willingness to pay as a measure of preference?

Required Readings:

1. Neumann PJ, Goldie SJ, Weinstein MC. Preference-based measures in economic evaluation in health care. Annual Rev Public Health 2000;21:587-611. [**HealthLinks**]
2. Gold MR et al. Identifying and valuing outcomes. Chapter 4 (pp.82-134) in Gold MR, et al. Eds. Cost-Effectiveness in Health and Medicine 1997 Oxford University Press. [**Core Text**]
3. Klose T. The contingent valuation method in health care. Health Policy 1999;47:97-123. [**HealthLinks**]

Suggested Readings:

1. Neumann PJ et al. The quality of reporting in published cost-utility analyses, 1976-1997. Ann Intern Med 2000;132:964-972. [**HealthLinks**]
2. Tufts-NEMC Catalogue of Preference Scores. <http://www.tufts-nemc.org/cearegistry/index.html>

SESSION #6

October 31

I. **Student Project Updates; Progress Reports Due**

II. JOURNAL OF COST AND OUTCOMES RESEARCH EDITORIAL BOARD MEETING

Veenstra & Garrison

Paper 1: O'Brien et al. Cost-effectiveness of the implantable cardioverter-defibrillator: results from the Canadian Implantable Defibrillator Study (CIDS). *Circulation*. 2001 Mar 13;103(10):1416-21.

Authors (Summarize results, defend assumptions and analysis): **GROUP 1**

Reviewers (Summarize study importance, highlight weaknesses): **GROUP 2**

Editorial board (Synthesize Authors/Reviewers comments, REJECT or ACCEPT paper) **GROUP 3**

Paper 2: Economic evaluation of measles catch-up and follow-up campaigns in Afghanistan in 2002 and 2003. Vijayaraghavan M., et al. *Disasters* 2006;30(2):256-69.

Authors (Summarize results, defend assumptions and analysis): **GROUP 2**

Reviewers (Summarize study importance, highlight weaknesses): **GROUP 3**

Editorial board (Synthesize Authors/Reviewers comments, REJECT or ACCEPT paper) **GROUP 1**

Paper 3: Hornberger J., et al. Economic Analysis of Targeting Chemotherapy Using a 21-Gene RT-PCR Assay in Lymph-Node–Negative, Estrogen-Receptor–Positive, Early-Stage Breast Cancer. *Am J Manag Care*. 2005;11:313-324)

Authors (Summarize results, defend assumptions and analysis): **GROUP 3**

Reviewers (Summarize study importance, highlight weaknesses): **GROUP 1**

Editorial board (Synthesize Authors/Reviewers comments, REJECT or ACCEPT paper) **GROUP 2**

Required Reading

Guidelines for authors and peer reviewers of economic submissions to the BMJ. The BMJ Economic Evaluation Working Party. *BMJ*. 1996 Aug 3;313(7052):275-83. [**Healthlinks**]

Chiou et al. Development and validation of a grading system for the quality of cost-effectiveness studies. *Med Care* 2002;41(1)32-44. [**HealthLinks**]

SESSION #7

November 7

MARKOV MODELING, PROBABILISTIC SENSITIVITY ANALYSIS, AND DISCRETE EVENT SIMULATION

Veenstra

Objectives for this Session - After this session, students will be able to:

1. Evaluate published studies using Markov modeling techniques
2. Model disease progression using a Markov model
3. Derive transition probabilities for a Markov model
4. Build a simple Markov model using standard spreadsheet software
5. Derive probability distributions for Monte Carlo simulations
6. Conduct 1-way and 2-way sensitivity analyses
7. Explain the conduct and interpretation of probabilistic sensitivity analysis
8. Describe the pros and cons of discrete event simulation

Required Readings:

1. Pettiti . Meta-analysis, Decision Analysis, and Cost-effectiveness Analysis: Methods for Quantitative Synthesis in Medicine. New York, NY: Oxford University Press Inc; 1994. Section 9.5 [**Core Text**]
2. Claxton K, Sculpher M, McCabe C, Briggs A, Akehurst R, Buxton M, Brazier J, O'Hagan T. Probabilistic sensitivity analysis for NICE technology assessment: not an optional extra. *Health Econ*. 2005 Apr;14(4):339-47.
3. Caro JJ. Pharmacoeconomic analyses using discrete event simulation. *Pharmacoeconomics* 2005;23(4):323-32.

Suggested Readings:

1. Briggs A, Sculpher M. An introduction to Markov modeling for economic evaluation. *Pharmacoeconomics* 1998;13:397-409 [**HealthLinks**]
2. Naimark D, Krahn MD, Naglie G, et al. Primer on medical decision analysis: Part 5—Working with Markov processes. *Medical Decision Making* 1997;17:152-59. [**HealthLinks**]
3. Sonnenberg FA, Beck JR. Markov models in medical decision-making: a practical guide. *Medical Decision Making* 1993;13:322-338. [**HealthLinks**]
4. Miller DK, Homan SM. Determining transition probabilities: Confusion and suggestions. *Medical Decision Making* 1994;14:52-58. [**HealthLinks**]
5. Doubilet P, Begg CB, Weinstein MC, Braun P, McNeil BJ. Probabilistic sensitivity analysis using Monte Carlo simulation. A practical approach. *Med Decis Making*. 1985 Summer;5(2):157-77.

SESSION #8

November 14

COST-EFFECTIVENESS TRIALS; ECONOMIC ISSUES AND GENETICS

Garrison and Veenstra

Objectives for this Session - After this session, students will be able to:

1. Define the data collection requirements for trial-based economic evaluations
2. Understand the challenges of statistical analysis of economic evaluations
3. Identify cost-effectiveness drivers for genetic testing
4. Explain the potential economic risks associated with genetic testing.

Topics

1. Design of trial-based economic evaluations
2. Statistical analysis of trial-based economic evaluations
3. Assessing cost-effectiveness of genetic testing
4. Genetic testing and employability and insurability

Required Readings:

1. Ramsey and Willke. Good research practices for cost-effectiveness analysis alongside clinical trials: the ISPOR RCT-CEA Task Force report. *Value Health*. 2005 Sep-Oct;8(5):521-33.
http://www.ispor.org/workpaper/clinical_trial.asp
2. Flowers CR, Veenstra D. The role of cost-effectiveness analysis in the era of pharmacogenomics. *Pharmacoeconomics*. 2004;22(8):481-93. [**HealthLinks**]
3. Garrison LP and Austin MJF. The economics of personalized medicine: a model of incentives for value creation and capture. 41 *Drug Information Journal*, 2007 [**HealthLinks**]

Suggested Readings:

1. Ramsey et al. Cost-effectiveness of lung-volume-reduction surgery for patients with severe emphysema. *N Engl J Med*. 2003;348(21):2134-6. [**HealthLinks**]
2. O'Brien B. Economic evaluation of pharmaceuticals. Frankenstein's monster or vampire of trials? *Med Care*. 1996; 34: DS99-108. [**HealthLinks**]
3. Masood E. Gene tests: who benefits from risk? *Nature* 1996; 379:389-392. [**HealthLinks**]
4. Garrison LP, Austin F. Linking pharmacogenetics-based diagnostics and drugs for personalized medicine. *Health Aff (Millwood)*. 2006 Sep-Oct;25(5):1281-90. [**HealthLinks**]

SESSION #9

November 21

RESOURCE ALLOCATION DECISIONS IN THE REAL WORLD.

Sean Sullivan

Objectives for this Session - After this session, student will be able to:

1. Describe the challenges of utilizing cost-effectiveness studies for decision making in the U.S.;
2. Develop a strategy for presenting cost-effectiveness information to real-world decision makers

Required Readings:

1. AMCP Format for Formulary Submissions Version 2.1. Forward and Preface, pp. iv – xxii. http://www.fmcenet.org/data/resource/Format~Version_2_1~Final_Final.pdf
2. Claxton K, Sculpher M, Drummond M. A rational framework for decision-making by the National Institute for Clinical Excellence (NICE). *Lancet* 2002;360:711-15. **[HealthLinks]**
3. Colmenero F, Sullivan SD, et al. Quality of clinical and economic evidence in dossier formulary submissions. *Am J Manag Care*. 2007 Jul;13(7):401-7. **[HealthLinks]**

Suggested readings:

1. Chapter 10 in Drummond text.
2. Cookson R, McDaid D, Maynard A. Wrong SIGN, NICE mess: is national guidance distorting allocation of resources? *BMJ* 2001 Sep 29;323(7315):743-5. **[HealthLinks]**
3. Rawlins M. In pursuit of quality: the National Institute for Clinical Excellence. *Lancet* 1999 Mar 27;353(9158):1079-82. And related: Horton R. Commentary. *Lancet* 1999 Mar 27;353(9158):1028-29. **[HealthLinks]**

Useful websites for HTA and Resource Allocation:

<http://www.cms.hhs.gov/home/medicare.asp>

<http://www.nice.org.uk/>

<http://www.health.gov.au/pbs>

<http://www.cadth.ca>

<http://www.ohsu.edu/drugeffectiveness/reports/final.cfm>

<http://www.ahrq.gov/clinic/techix.htm#progress>

SESSION #10

November 28

STUDENT PROJECT PRESENTATIONS

| Time | Name | Time | Name |
|-------------|-------------|-------------|-------------|
| 8:30-8:45 | _____ | 10:15-10:30 | _____ |
| 8:45-9:00 | _____ | 10:30-10:45 | _____ |
| 9:00-9:15 | _____ | 10:45-11:00 | _____ |
| 9:15-9:30 | _____ | 11:00-11:15 | _____ |
| 9:30-9:45 | _____ | 11:15-11:30 | _____ |
| 9:45-10:00 | _____ | 11:30-11:45 | _____ |
| 10:00-10:15 | _____ | 11:45-12:00 | _____ |

ALL PROJECT PAPERS DUE AT BEGINNING OF CLASS

STUDENT PROJECT PRESENTATIONS

| Time | Name | Time | Name |
|-------------|-------|-------------|-------|
| 8:30-8:45 | _____ | 10:15-10:30 | _____ |
| 8:45-9:00 | _____ | 10:30-10:45 | _____ |
| 9:00-9:15 | _____ | 10:45-11:00 | _____ |
| 9:15-9:30 | _____ | 11:00-11:15 | _____ |
| 9:30-9:45 | _____ | 11:15-11:30 | _____ |
| 9:45-10:00 | _____ | 11:30-11:45 | _____ |
| 10:00-10:15 | _____ | 11:45-12:00 | _____ |