

Cost Effectiveness Analysis HSMP 6609, Spring 2020

4/2/2020

Instructors:

Marcelo Coca Perrailon
Department of Health Systems, Management & Policy
Colorado School of Public Health
Building 500, Rm. E3312
E-mail: marcelo.perrailon@ucdenver.edu
Office Hours: Available by appointment (e-mail to schedule)

TA: Benjamin Dellos
E-mail: benjamin.dellos@ucdenver.edu
Office Hours: Available by appointment (e-mail to schedule)

Course Title: Cost Effectiveness Analysis
Credit Hours: Two Credit Hours
Meeting Time: Wednesday, 9am-11:00am
Meeting Place: Ed 2 South 1307

Competencies mapped to this course for assessment:

CN-HSMP 2: Apply commonly used methods for evaluating health economic policy, including the use of cost-benefit and cost-effectiveness analysis.

Course Overview:

This course overviews the theory and applications of economic evaluation of health interventions. Topics to be covered include:

- Types of economic evaluations: cost-effectiveness, cost-utility, and cost-benefit analysis
- Comparison of the different types of economic evaluations
- Measurement of costs
- Cost saving studies
- Measurement of outcomes including health status and health-related quality of life, assigning monetary values to outcomes, the value of a human life and quality-adjusted life years
- Discounting of future costs and benefits
- Cost-effectiveness and health equity (distributional cost-effectiveness)
- Decision analysis and Markov models
- Sensitivity analysis including probabilistic sensitivity analysis
- Critical assessment of economic evaluation studies

The course uses basic microeconomic and statistical tools. While it is not required, it is recommended that students have taken both introductory microeconomics and statistics courses.

Attendance is not mandatory. Groups are **optional**, but I suggest you form a group.

Cost Effectiveness Analysis HSMP 6609, Spring 2020

Learning Objectives

1. The student will be able to understand cost and effectiveness measures; to distinguish among cost-effectiveness, cost-benefit, and cost-utility analyses and know the advantages and disadvantages of each approach; and to understand the various perspectives that can be taken in an economic evaluation study.
2. The student will have an appreciation for some of the controversies in the field. For example, the costs of consumption in additional life years, productivity changes, discounting, prediction of health utilities, and the relevant analytic point of view.
3. The student will learn and be able to use Excel to construct decision models and Markov models.
4. The student will understand and be able to apply decision and Markov models.
5. The student will be familiar with the statistical issues of cost-effectiveness analysis and the different approaches for incorporating the uncertainty associated with point estimates of the incremental cost-effectiveness ratio.
6. The student will be able to assess the quality of an economic evaluation study.
7. The student will know the new recommendations of the Panel on Cost-Effectiveness Research (2016).

IV. Evaluation

All assignments assess competency CN-HSMP 2: Apply commonly used methods for evaluating health economic policy, including the use of cost-benefit and cost-effectiveness analysis.

Grades are based on performance on:

- | | |
|-------------------------|-----|
| • Homework | 30% |
| • Special assignment I | 15% |
| • Special assignment II | 15% |
| • Final exam | 40% |

Homework: Homework assignments will be given in class and are due the following week. **Late assignment will have a penalty of 15 points** per day unless you have a valid reason to submit a late homework. If you have a valid reason to submit a late homework, you must inform the professor or TA **before** the due date.

Special Assignments: Details to be provided.

Final Exam: The final exam is scheduled for Wednesday, **May 13 at 9:00 a.m.** Please plan ahead. I cannot reschedule the exam.

Cost Effectiveness Analysis HSMP 6609, Spring 2020

Required textbook:

There is **no** required textbook for this class. However, **I strongly recommend you buy the book below**. It sells for less than \$40 and it covers the most important topics in the field.

Drummond, Michael F. et al. (2015). *Methods for the Economic Evaluation of Health Care Programmes*, **Fourth Edition**. Oxford: Oxford University Press.

Recommended textbooks:

Neumann, Peter J. et al (2016). *Cost-Effectiveness in Health and Medicine*. **2 edition**. Oxford ; New York: Oxford University Press, **2016**.

Additional Reading Material: Posted on Canvas. **Starred articles are optional.**

Expectations:

- I. Class attendance & Participation
 - A. Attendance is not required, but is highly recommended.
- II. Policies:
 - A. Academic Honesty: Refer to school guidelines.
 - B. Students are responsible for being attentive to or observant of campus policies regarding academic honesty as stated in the University's Student Conduct Code.
 - C. Plagiarism is the use of another person's words or ideas without crediting that person. Plagiarism and cheating will not be tolerated. Either plagiarism or cheating may lead to failure of an assignment, or the class, and/or dismissal from the University.
 - D. You are responsible for being attentive to or observant of campus policies about academic honesty as stated in the University's Student Conduct Code.
(<http://catalog.ucdenver.edu/content.php?catoid=6&navoid=530>)
- III. Access, Disability, Communication:

Students requesting accommodations for a disability must contact one of the following:
Sherry Holden and Christine Flug | Coordinators
University of Colorado Anschutz Medical Campus Disability Resources & Services
Strauss Health Sciences Library V23-1409A1
12950 E Montview Blvd, Aurora, CO 80045
Phone: (303) 724-5640, Fax (303) 724-5641
Monday-Friday 8:00-5:00
sherry.holden@cuanschutz.edu and Christine.flug@ucdenver.edu

Selim Özi | Assistive Technology Specialist, Accommodation Coordinator
University of Colorado Anschutz Medical Campus Disability Resources & Services
Strauss Health Sciences Library V23-1409A1
12950 E Montview Blvd, Aurora, CO 80045
Phone: (303) 724-5640, Fax: (303) 724-5641
selim.oz@cuanschutz.edu

Be aware that the determination of accommodations can take a long period of time. No accommodations will be made for the course until written documentation is provided by the Disability resources and services office to the course directors. It is the student's responsibility to coordinate approved accommodations with the Disability resources and services office in advance.

Cost Effectiveness Analysis HSMP 6609, Spring 2020

Further general Information regarding disability resources and services can be found at:
<http://www.ucdenver.edu/student-services/resources/disability-resources-services/accommodations/Pages/accommodations.aspx>

Students can set up an appointment at:

<http://www.ucdenver.edu/student-services/resources/disability-resources-services/about-office/contact-us-CUAnschutz/Pages/form.aspx>

IV. Civility:

- A. Adherence to the Student Conduct Code is expected. I am committed to creating a climate for learning, characterized by respect for each other and the contributions each person makes to class. I ask that you make a similar commitment.
- B. Please turn off beepers and cell phones during class.**

(Note: starred articles are optional)

Class topics by week

All weekly classes address competency CN-HSMP 2: Apply commonly used methods for evaluating health economic policy, including the use of cost-benefit and cost-effectiveness analysis.

Week 1: Overview of Economic Evaluations

Drummond et al., Chapter 1

Cutler, David M. "What Is the US Health Spending Problem?" *Health Affairs* 37, no. 3 (February 14, 2018): 493–97.

*Kolata, Gina. "New Gene-Therapy Treatments Will Carry Whopping Price Tags," *The New York Times*, 9/11/2017.

*Eisenberg, John M. "Clinical Economics: A Guide to the Economic Analysis of Clinical Practices," *Journal of the American Medical Association* vol. 262, no. 20, November 24, 1989, pp. 2879-2886.

*Detsky, Allan S., and I. Gary Naglie. A Clinician's Guide to Cost-Effectiveness Analysis, *Annals of Internal Medicine* vol. 113, no. 2, 15 July 1990, pp. 147-154.

*Weinstein, Milton C., and William B. Stason. "Foundations of Cost-Effectiveness Analysis for Health and Medical Practices." *New England Journal of Medicine* 296, no. 13 March 31, 1977: 716–21.

Week 2: Critical Assessment of Economic Evaluation

Drummond et al., Chapter 3

Neuhauser, Duncan, and Ann M. Lewicki. "What Do We Gain from the Sixth Stool Guaiac?" *New England Journal of Medicine* 293, no. 5 (July 31, 1975): 226–28.

*Drummond, Michael, and Mark Sculpher. "Common Methodological Flaws in Economic Evaluations." *Medical Care* 43, no. 7 Suppl (July 2005): 5–14.

*Weinstein, M. C., J. E. Siegel, M. R. Gold, M. S. Kamlet, and L. B. Russell. "Recommendations of the Panel on Cost-Effectiveness in Health and Medicine." *JAMA* 276, no. 15 (October 16, 1996): 1253–58.

Weeks 3 and 4: Measuring Costs and Cost-analysis

Cost Effectiveness Analysis HSMP 6609, Spring 2020

Drummond et al., Chapter 7

Neumann et al., Chapter 8

- *Weinstein, M. C., and W. G. Manning. "Theoretical Issues in Cost-Effectiveness Analysis." *Journal of Health Economics* 16, no. 1 (February 1997): 121–28.
- *Liljas, Bengt, Göran S. Karlsson, Nils-Olov Stålhammar. "On future non-medical costs in economic evaluations," *Health Economics* vol. 17, 2008, pp. 579-591.
- *Koopmanschap, Marc A., Job N.A. vanExel, Bernard van den Berg, Werner B. F. Brouwer. "An Overview of Methods and Applications to Value Informal Care in Economic Evaluations of Healthcare," *Pharmacoeconomics* vol. 26, no. 4, 2008, pp. 269-280.
- *Brouwer, Werner B. F., Marc A. Koopmanschap, Frans F. H. Rutten. "Productivity cost measurement through quality of life? A response to the recommendation of the Washington Panel," *Health Economics* vol. 6, 1997, pp. 253-259.
- *Weinstein, Milton C., Joanna E. Siegel, Alan M. Garber, Joseph Lipscomb, Bryan R. Luce, Willard G. Manning, Jr., George W. Torrance. "Productivity Costs, Time Costs and Health-Related Quality of Life: A Response to the Erasmus Group," *Health Economics* vol. 6, pp. 505-511.
- *Brouwer, Werner B. F., Marc A. Koopmanschap, Frans F. H. Rutten. "Productivity cost in cost-effectiveness analysis: Numerator or denominator: A further discussion." *Health Economics* vol. 6, 1997, pp. 511-514.

Week 5: Cost saving studies

Perrailon, MC, Lindrooth, R, Welton JM. "Difference-in-Difference Designs," *Nursing Economics*, Volume 37, Number 6, 2019.

Perrailon MC, Kortsch DU, Chiapuso C, Levinson AH. "Short-term Cost Savings from a Decline in Acute Vascular Events Attributable to a Smoking Cessation Initiative in a Safety Net Health Organization," 2020.

Perrailon, MC, Lindrooth R. "The Effects on Outcomes and Cost Savings from the Provision of Free Long-Acting Reversible Contraceptives", 2018.

Week 6: Cost-effectiveness Analysis I

Drummond et al., Chapter 5.

- *Stinnett, A. A., and J. Mullahy. "Net Health Benefits: A New Framework for the Analysis of Uncertainty in Cost-Effectiveness Analysis." *Medical Decision Making: An International Journal of the Society for Medical Decision Making* 18, no. 2 Suppl (June 1998): S68–80.
- *Krahn, Murray, and Amiram Gafni. "Discounting in the Economic Evaluation of Health Care Interventions." *Medical Care* 31, no. 5 (1993): 403–18.
- *Viscusi, W.K. "Discounting Health Effects for Medical Decisions." In *Valuing Health Care: Costs, Benefits, and effectiveness of Pharmaceuticals and Medical Technologies* (Ed. F. A Sloan), pp.123-145. Cambridge University Press, New York.
- *Brouwer WBF, Niessen LW, Postma MJ, Rutten FFH. "Need for Differential Discounting of Costs and Health Effects in Cost-effectiveness Analysis," *British Medical Journal* vol. 331, 2005, pp. 446-448.

Cost Effectiveness Analysis HSMP 6609, Spring 2020

- *Gravelle, Hugh, and Dave Smith. "Discounting for Health Effects in Cost-Benefit and Cost-Effectiveness Analysis," *Health Economics* vol. 10, no. 7, October 2001, pp. 587-599.
- *Claxton, Karl, Mark Sculpher, Anthony Culyer et al. "Discounting and Cost-effectiveness in NICE—Stepping Back to Sort out a Confusion," *Health Economics* vol. 15, 2006, pp. 1-4.
- *Cohen, David J., and Matthew R. Reynolds. "Interpreting the Results of Cost-Effectiveness Studies." *Journal of the American College of Cardiology* 52, no. 25 (December 16, 2008): 2119–26.

Weeks 7 and 8: Cost-effectiveness Analysis II

Drummond et al., Chapter 5

Neumann, Peter J., Joshua T. Cohen, and Milton C. Weinstein. "Updating Cost-Effectiveness — The Curious Resilience of the \$50,000-per-QALY Threshold." *New England Journal of Medicine* 371, no. 9 (August 28, 2014): 796–97.

- *Perraillon, Marcelo Coca, Ya-Chen Tina Shih, and Ronald A. Thisted. "Predicting the EQ-5D-3L Preference Index from the SF-12 Health Survey in a National US Sample A Finite Mixture Approach." *Medical Decision Making*, April 3, 2015, 0272989X15577362.
- *Dolan, Paul, Claire Gudex, Paul Kind, and Alan Williams. The Time Trade-off Method: Results from a General Population Study, *Health Economics* 5(2), Mar-Apr 1996, pp. 141-154.
- *Shaw, James W., Jeffrey A. Johnson, Stephen Joel Coons. "US Valuation of the EQ-5D Health States: Development and Testing of the D1 Valuation Model," *Medical Care* vol. 43, no. 3, March 2005, pp. 203-220.
- *The EuroQol Group. EuroQol-a new facility for the measurement of health-related quality of life. *Health Policy* 1990; 16(3):199-208.
- *Bleichrodt, Hans. "A New Explanation for the Difference between Time Trade-Off Utilities and Standard Gamble Utilities," *Health Economics* vol. 11, no. 5, July 2002, pp. 447-456.
- *Bleichrodt, Hans and Magnus Johannesson. "Standard Gamble, Time Trade-off and Rating Scale: Experimental Results on the Ranking Properties of QALYs," *Journal of Health Economics* vol. 16, 1997, pp. 155-75.
- *Johannesson, Magnus, Joseph S. Pliskin, and Milton C. Weinstein. "A Note on QALYs, Time Tradeoff, and Discounting," *Medical Decision Making* vol. 14, no. 2, April-June 1994, pp. 199-193.

Weeks 9, 10, 11: Methods: Decision Analysis and Markov Models

Drummond et al., Chapter 9

Decision Modelling for Health Economic Evaluation. 1 edition. Oxford: Oxford University Press, 2006. Chapter 2.

- *Sonnenberg, Frank A. and J. Robert Beck. "Markov Models in Medical Decision Making: A Practical Guide," *Medical Decision Making* vol. 13, no. 4, Oct-Dec 1993, pp. 322-338.
- *Detsky, Allan, et al. "Primer on Medical Decision Making: Part 1, 2, 3 and 4," *Medical Decision Making* vol. 17, no. 2, Apr-Jun 1997, pp. 123-151.
- *Weinstein, Milton C. "Recent Developments in Decision-Analytic Modeling for Economic Evaluation," *Pharmacoeconomics* vol. 24, no. 11, 2006, pp. 1043-1053.

Cost Effectiveness Analysis HSMP 6609, Spring 2020

- *Weinstein, Milton C. et al. "Principles of Good Practice for Decision Analytic Modeling in Health-Care Evaluation: Report of the ISPOR Task Force on Good Research Practices—Modeling Studies," *Value in Health* vol. 6, no. 1, 2003, pp. 9-17.
- *Hay, Joel. "Evaluation and Review of Pharmacoeconomic Models," *Expert Opinion in Pharmacotherapy* vol. 5, no. 9, 2004, pp. 1-14.

Weeks 12: Modeling Infectious Diseases and Cost-benefit Analysis, Budget Impact,

Drummond et al., Ch. 6

- *Viscusi, W. Kip and Joseph E. Aldy. "The Value of a Statistical Life: A Critical Review of Market Estimates Throughout the World," *Journal of Risk and Uncertainty* vol. 27, no. 1, 2003, pp. 5-76.
- *Mauskopf, Sullivan, Annemans, Caro, Mullins, Nuijten, Orlewska, Watkins, Trueman. "Principles of Good Practice for Budget Impact Analysis: Report of the ISPOR Task Force on Good Research Practices—Budget Impact Analysis," *Value in Health*, 2007.
- *Hirth, Richard A, Michael E. Chernew, Edward Miller, A. Mark Fendrick, William G. Weissert. "Willingness to Pay for a Quality-adjusted Life Year: In Search of a Standard," *Medical Decision Making* vol. 20, no. 3, Jul-Sep 2000, pp. 332-342.
- *Bobinac, Ana, N.J. A. van Exel, Frans F. H. Rutten, Werner B. F. Brouwer. "Willingness to Pay for a Quality-Adjusted Life Year: The Individual Perspective," *Value in Health* vo. 13, no. 8, 2010, pp. 1046-55.
- *Molinari N. A., I. R. Ortega-Sanchez, M. L. Messonnier, W. W. Thompson, P. M. Wortley et al. "The Annual Impact of Seasonal Influenza in the US: Measuring Disease Burden and Costs." *Vaccine* vol. 25, 2007, pp. 5086-96.
- *O'Brien, B. and J. Viramontes. "Willingness to Pay: A Valid and Reliable Measure of Health State Preference?" *Medical Decision Making* vol. 14, no. 3, July/September, 1994, pp. 290-297.
- *Neumann, Peter J. and Magnus Johannesson. "The willingness to pay for in vitro fertilization: A pilot study using contingent valuation," *Medical Care* vol. 32, 1994, pp. 686-99.
- *Molinari N. A., I. R. Ortega-Sanchez, M. L. Messonnier, W. W. Thompson, P. M. Wortley et al. "The Annual Impact of Seasonal Influenza in the US: Measuring Disease Burden and Costs." *Vaccine* vol. 25, 2007, pp. 5086-96.
- *Freijer, Karen, Mark J. C. Nuijten and Jos M. G. A Schols. "The budget impact of oral nutritional supplements for disease related malnutrition in elderly in the community setting," *Frontiers in Pharmacology*, 2012.
- *Larg A and Moss JR. "Cost of Illness Studies: A Guide to Critical Evaluation," *Pharmacoeconomics*, 2011.
- *Noskin, Rubin, Schentag, Kluytmans, Hedblom, Jacobson, Smulders, Gemmen, Bharmal. "Budget Impact Analysis of Rapid Screening for Staphylococcus aureus Colonization Among Patients Undergoing Elective Surgery in US Hospitals," *Infection Control and Hospital Epidemiology*, 2008.

Week 13: Measuring Uncertainty in Economic Evaluations

Drummond et al, Chapter 11

- *Fenwick E, Claxton K, Sculpher M. "Representing uncertainty: The role of cost-effective acceptability curves," *Health Economics* vol. 10, 2001, pp. 779-789.

Cost Effectiveness Analysis
HSMP 6609, Spring 2020

Week 14: Economic evaluation, Health Policy and Health Equity

Neumann et al., Chapter 1

Asaria, Miqdad, Susan Griffin, and Richard Cookson. "Distributional Cost-Effectiveness Analysis." *Medical Decision Making* 36, no. 1 (January 2016): 8–19.

Fuchs VR, Milstein A. The \$640 Billion Question – Why Does Cost-effective Care Diffuse So Slowly? *New Engl J Med* 2011; 364:1985-1987

*Blumstein, James F. "The Oregon Experiment: The Role of Cost-Benefit Analysis in the Allocation of Medicaid Funds," *Social Science and Medicine* vol. 45, no. 4, 1997, pp. 545-54.

*Avorn, Jerry. "The Debate about Funding Comparative Effectiveness Research," *New England Journal of Medicine* vol. 360, no. 19, May 7, 2009, pp. 1927-9.

*Tengs, T. O., M. E. Adams, J. S. Pliskin, D. G. Safran, J. E. Siegel, M. C. Weinstein, and J. D. Graham. "Five-Hundred Life-Saving Interventions and Their Cost-Effectiveness." *Risk Analysis: An Official Publication of the Society for Risk Analysis* 15, no. 3 (June 1995): 369–90.

*Grosse, Scott D., Steven M. Teutsch, and Anne C. Haddix. "Lessons from Cost-Effectiveness Research for United States Public Health Policy." *Annual Review of Public Health* 28 (2007): 365–91.

Week 15: Review

Review of key topics in preparation for final exam.

Week 16: Final exam (5/13)