SPPH 581Q: Economic Evaluation in Health Care – part 2

The University of British Columbia  
School of Population and Public Health

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Calendar Entry:  2013 Term 2 (spring)  
Credits:  3

General Course Description:  This course directly follows on from SPPH 541, and provides students with the opportunity to gain in-depth and practical skills in conducting economic evaluation of health technologies. In addition, the course considers, in detail, the policy context for the use of economic evaluation, drawing on experiences and evidence from both Canadian and international settings. Finally, current methodological and theoretical debates are presented, supplementing the topics already discussed in SPPH 541.

Prerequisites:  SPPH 541

Corequisites:  None

Background:  Biomedical science is progressing at a rapid pace and available health care technologies to prevent, treat, or control diseases are becoming more numerous, complex, and expensive. Concordantly, decision makers face the challenge of maximizing the benefit obtained from the dollars spent in treatments, as well as in research. Over recent years, the theoretical and methodological framework underpinning economic evaluations has evolved to cope with such challenges and complexities. This course will cover, in depth, the methodological aspects of economic evaluation applied to health care topics and provide opportunities for practical, hands-on skill development. This course is aimed at those who wish to be able to perform 'production level' economic evaluations suitable for publication in peer-reviewed journals or reports to decision makers at government agencies or stakeholders in the industry.

This course is a direct continuation of SPPH 541 and students are expected to be familiar with the content of that course. Knowledge of statistics, epidemiology, and some basics of health economics are also required.

Format:  The course will be a combination of lecture presentations, interactive practical modelling sessions, assignments and individual projects. The topics for each session are provided below. Generally, the content of the course can be divided into three sections: (i) in-depth coverage of applied techniques of conducting economic evaluations; (ii) policy context for use of economic evaluation; and (iii) current methodological debates.
Objectives:
As a result of this course, students will be able to:

- Develop a deep understanding of the available methodologies for conducting economic evaluation of health care technologies, including an ability to distinguish clearly between decision modelling and data-driven paradigms
- Perform economic evaluation analyses, suitable for publication in peer-reviewed journals, using both decision modelling and data-driven approaches
- Establish the extent of uncertainty in the analysis results
- Understand the challenges involved in the policy use of economic evaluation and have identified strategies for overcoming the barriers, drawing on international experiences
- Take part in informed discussions of some of the key methodological issues currently being debated in the health economic evaluation literature

Evaluation:
Class participation (20%)
Midterm report and presentation (30%)
Final project (50%)

Students will be assigned a mark for their willingness to participate in class and online discussion and the degree to which their participation enhances discussion in the class. For the midterm evaluation, students are expected to write a protocol for an economic evaluation and present it in 10-minute sessions. The final evaluation consists of a project in which the student will construct an economic evaluation model and use it to address an economic evaluation of a health technology.
### Course Outline

<table>
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<tr>
<th>Recap</th>
<th>Review of theory and methods covered in SPPH 541</th>
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<tr>
<td><strong>Applied model-based economic evaluation methods</strong></td>
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<tr>
<td><strong>Model-based evaluations</strong></td>
<td>Alternative modelling approaches (with focus on Markov models and discussion of discrete event simulation, individual sampling models, etc.) and model selection</td>
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| **Key references:** | - A taxonomy of model structures for economic evaluation of health technologies.  
| **Objectives:** | - To develop a deep understanding of different modeling frameworks for decision analysis.  
- To be able to categorize a modeling framework according to cohort/individual, interactive/non-interactive, and Discrete/continuous time  
- To enumerate the advantages and disadvantages of cohort versus individual models.  
- To list some of the available software platforms for decision analysis. |

| Session 2 | Model building (with exercises) to include: defining model structure, input tables for model population and evidence synthesis, indirect comparisons, selecting appropriate distributions for probabilistic base case, correlations between parameters, etc.  
This will be a very practical session with presenting a case study and building a model from scratch. No reference needed. |
| **Objectives:** | - To apply judgment on the appropriateness of different modeling frameworks to address a particular decision-analytic task.  
- To apply judgment on the appropriateness of different software platforms to implement a model.  
- To create a simple decision tree and Markov model in Microsoft Excel, and describe the strength and shortcomings of such a choice for modeling platform. |

| Session 3 and 4 | Analyses: probabilistic base case, sensitivity analyses (with exercises) |
| **Key reference:** | - Probabilistic sensitivity analysis for NICE technology assessment: not an optional extra |
| **Objectives:** | - To develop a deep understanding of the first-level, second-level, and modeling uncertainty  
- To understand the decision-theoretic argument for defining the ICER as the ratio of means rather than the mean of a ratio  
- To learn practical challenges in performing PSA  
- To learn how to perform inference, including constructing credible intervals, cost-
### Data-driven evaluations

Economic evaluation data sets: components, data collection, etc.

**Key references:**
- Experimental versus observational data in the economic evaluation of pharmaceuticals
- Whither trial-based economic evaluation for health care decision making?

**Objectives:**
- To understand the theoretical concepts underlying data-driven economic evaluations.
- To understand the processes required for measuring cost and effectiveness outcomes alongside an RCT.
- To understand the potential role of observational studies in economic evaluations.
- To understand the challenges posed by non-random treatment assignments and the potential remedies in economic evaluations based on observational data.
- To understand the tradeoff between internal and external validity in data-driven economic evaluations.

### Session 6

Analyses: Missing data, Bootstrapping, Bayesian perspective, incorporating external evidence, etc. (with exercises)

**Key references:**
- Pulling cost-effectiveness analysis up by its bootstraps: a non-parametric approach to confidence interval estimation.
- Estimating the cost-effectiveness of fluticasone propionate for treating chronic obstructive pulmonary disease in the presence of missing data.
- Cost effectiveness of therapy with combinations of long acting bronchodilators and inhaled steroids for treatment of COPD
- Something old, something new, something borrowed, something blue: a framework for the marriage of health econometrics and cost-effectiveness analysis.

**Objectives**
- To understand the theoretical challenges in obtaining unbiased estimates for cost and effectiveness outcomes in the presence of missing data and incomplete follow-up.
- To compare and contrast the parametric and non-parametric approaches in inference on outcomes in an RCT-based economic evaluation.
- To understand the theoretical basis and practical aspects of the bootstrap for inference in data-driven CEAs.

### Session 7

Uncertainty and presentation of results (for both model-based and data-driven analyses)

**Objectives**
- To understand the expected value of information analysis, presentation of results (with calculations for both model-based and data-driven analyses.**
exercises)

**Key references:**
- Representing uncertainty: the role of cost-effectiveness acceptability curves.
- The irrelevance of inference: a decision-making approach to the stochastic evaluation of health care technologies
- Sensitivity analysis and the expected value of perfect information.

**Objectives**
- To compare and contrast the 'adoption question' and 'research question'
- To understand why inference is irrelevant in treatment decision
- To understand the theoretical backgrounds in value of information analysis
- To interpret EVPI, EVPPI, and EVSI
- To calculate EVPI from PSA data

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<th>Session 9</th>
<th>Examples: practical case study session (to consolidate learning)</th>
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**Policy context for use of economic evaluation**

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<tr>
<th>Session 10</th>
<th>The use of economic evaluation in policy making: an exploration of conceptual and practical issues, including the search for a cost-effectiveness threshold</th>
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<tr>
<td>Session 11</td>
<td>Evidence from international experience in the use of economic evaluation: the good the bad and the ugly...</td>
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**Current debates** (suggested topics but these will be selected each year to ensure that ‘current’ debates are reflected in the course)

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<th>Session 11</th>
<th>Welfarism versus extra-welfarism; Critiques of the QALY; Capabilities theory and its implications for health economic evaluation</th>
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<td>Session 12</td>
<td>Productivity measurement (Guest speaker: Dr. Aslam Anis); Debates on discounting and time preference in health evaluation</td>
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References

Text books


Articles


