Cost Effectiveness Modelling for Health Technology Assessment

A 5-day practical course

20 April – 24 April 2026 | Edinburgh

Programme

Cost Effectiveness Modelling for Health Technology Assessment

Faculty

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Note on Presenters:

A Main Presenter delivers each Session with the assistance of another member of the Faculty. The Sessions are delivered as either a lecture, or a lecture with applied exercises to be completed and discussed during the session. Each day of the course is made of four sessions, with the exception of the first day, which starts in the afternoon and consists of two sessions.

Learning Objectives

- Understand the concepts and rationale of HTA and types of economic evaluation
- Understand when you would use a decision tree model and how they work
- Understand when you would use a Markov model, how they work and how to use them to inform decision making
- Appreciate the importance of uncertainty in economic evaluations and how this can be assessed
- Be able to generate a probabilistic Markov model in Excel and produce and interpret outputs
- Understand the concept of value of information and calculate this from probabilistic model results
- Learn about key developments and debates in HTA including precision medicine, real-world evidence and the willingness to pay threshold

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Course Schedule

Day 1: Monday 20 April 2026

12:00 – 13:00	***Registration and Lunch***	
13:00 – 14:15	**Session 1:** **Introduction to HTA and Economic Evaluations**	Peter Hall and David Meads
14:15 – 14:30	***Tea & Coffee***	
14:30 – 15:45	**Session 2:** **Economic Evaluations (inc. trial-based)**	David Meads and Peter Hall

Day 2: Tuesday 21 April 2026

09:00 – 09:30	***Registration and coffee***	
09:30 – 10:45	**Session 3:** **Decision Model-based Economic Evaluations**	David Meads and Alison Smith
10:45 – 11:00	***Tea & Coffee***	
11:00 – 12:15	**Session 4:** **Decision-Analytic Models – Decision Tree Models**	Alison Smith and David Meads
12:15 – 13:15	***Lunch***	
13:15 – 14:30	**Session 5:** **Decision-Analytic Models – Considerations in Diagnostics**	Alison Smith and David Meads
14:30 – 14:45	***Tea & Coffee***	
14:45 – 16:00	**Session 6:** **Decision Tree Models – Sensitivity Analysis**	David Meads and Alison Smith

Day 3: Wednesday 22 April 2026

09:00 – 09:30	***Registration and coffee***	
09:30 – 10:45	**Session 7:** **Decision-Analytic Models – Markov Models 1**	David Meads and Daniel Howdon
10:45 – 11:00	***Tea & Coffee***	
11:00 – 12:15	**Session 8:** **Decision-Analytic Models – Markov Models 2**	Daniel Howdon and David Meads
12:15 – 13:15	***Lunch***	
13:15 – 14:30	**Session 9:** **Markov Models – Probabilistic Sensitivity Analysis 1**	Giovanni Tramonti and Daniel Howdon
14:30 – 14:45	***Tea & Coffee***	
14:45 – 16:00	**Session 10:** **Markov Models – Probabilistic Sensitivity Analysis 2**	David Meads and Giovanni Tramonti

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Day 4: Thursday 23 April 2026

09:00 – 09:30	***Registration and coffee***	
09:30 – 10:45	**Session 11:** **Markov Models – Probabilistic Sensitivity Analysis 3**	David Meads and Daniel Howdon
10:45 – 11:00	***Tea & Coffee***	
11:00 – 12:15	**Session 12:** **Decision Uncertainty**	Giovanni Tramonti and Daniel Howdon
12:15 – 13:15	***Lunch***	
13:15 – 14:30	**Session 13:** **Introduction to Modelling in R**	Giovanni Tramonti and Daniel Howdon
14:30 – 14:45	***Tea & Coffee***	
14:45 – 16:00	**Session 14:** **Use of Real-World Evidence for decision-making 1**	Daniel Howdon and Giovanni Tramonti

Day 5: Friday 24 April 2026

09:00 – 09:30	***Registration and coffee***	
09:30 – 10:45	**Session 15:** **Use of Real-World Evidence for decision-making 2**	Daniel Howdon and Giovanni Tramonti
10:45 – 11:00	***Tea & Coffee***	
11:00 – 12:15	**Session 16:** **Use of Real-World Evidence for decision-making 3**	Daniel Howdon and Giovanni Tramonti
12:15 – 13:15	***Lunch***	
13:15 – 14:30	**Session 17:** **Current methodological debate in HTA**	Daniel Howdon, Peter Hall and Giovanni Tramonti
14:30 – 14:45	***Tea & Coffee***	
14:45 – 16:00	**Session 18:** **Current methodological debate in HTA**	Daniel Howdon, Peter Hall, and Giovanni Tramonti

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Session Details

Session 1: Introduction to HTA and Economic Evaluations

In this introductory session, participants will gain an understanding of the fundamentals of Health Technology Assessment (HTA) and its role in healthcare decision-making. They will learn about the global context of HTA and how it varies across different healthcare systems. The session will explore the reference case of the National Institute of Health and Care Excellence (NICE) as a prominent example of HTA. Concepts of reimbursement and cost-effectiveness thresholds will be explored, including the criteria that guide decisions on whether to fund specific healthcare technologies.

Session 2: Economic Evaluations (inc. trial-based)

This session will expand on the various types of economic evaluations commonly used in HTA, such as cost-effectiveness analysis, cost-utility analysis, and cost-benefit analysis. Participants will learn how costs and outcomes are measured, with the consideration of different perspectives, and also the fundamentals of clinical trials, with an emphasis on their importance in economic evaluation.

Session 3: Decision Model-based Economic Evaluations

The session covers decision model-based economic evaluations, providing insights into when and why these models are used. The topics will cover the data requirements, output generation, and the various types of models available. Decision models play a critical role in extrapolating outcomes beyond the duration of clinical trials, and this session will clarify their importance. The session will include brief MS Excel training exercises.

Session 4: Decision-Analytic Models – Decision Tree Models

This session will provide an in-depth exploration of designing decision tree models within the context of healthcare decision-making. Using a diagnostic technology case study, participants will learn how to construct and populate decision tree models. This type of models is among the most common in the field, and serve as invaluable tools for mapping out numerous healthcare scenarios, guiding the decision-making process by taking various possible pathways, probabilities, and associated outcomes into consideration.

Session 5: Decision-Analytic Models – Considerations in Diagnostics

In this session, several diagnostic considerations in decision-analytic models will be explored, with a focus on topics such as overdiagnosis, sensitivity and specificity, and the accuracy of diagnostic tests. The potential for overdiagnosis and its impact on healthcare decision-making will be examined and the concepts of sensitivity and specificity will be elaborated upon, emphasizing their role in the evaluation of diagnostic test performance. Furthermore, the process of adding a new clinical pathway to routine patient care will be discussed, providing practical knowledge into how the effects of diagnostic technologies on patient management strategies can be accounted for.

Session 6: Decision - Decision Tree Models – Sensitivity Analysis

This session will focus on the techniques of one-way sensitivity analysis and headroom analysis. Participants will learn how to systematically explore the impact of varying key parameters or assumptions on the outcomes within their decision trees. One-way sensitivity analysis allows for the identification of the most influential factors affecting the model's results, enabling decision-makers to understand the model's robustness. Additionally, headroom analysis will be covered, helping participants assess the financial feasibility of new interventions and pinpointing the range of costs within which a healthcare technology is likely to become cost-effective.

Session 7: Decision-Analytic Models – Markov Models 1

In this session, participants will be introduced to Markov models, understanding when and why these models are essential in healthcare decision-making. With a focus on practical application, the session will guide students through the design and setup of Markov models, emphasizing the construction of transition matrices and the computation of traces.

Session 8: Decision-Analytic Models – Markov Models 2

This session is a continuation of Session 7. The concept of probabilistic sensitivity analysis (PSA) will be introduced, enabling participants to explore the influence of uncertainty on model outcomes.

Session 9: Markov Models – Probabilistic Sensitivity Analysis 1

In this session, participants will learn setting up Probabilistic Sensitivity Analysis in healthcare decision modelling, with a specific emphasis on selecting parameters related to effectiveness and survival. Participants will learn how to incorporate uncertainty surrounding key effectiveness and survival parameters into their models for a more detailed exploration of the impact of these uncertainties on the model's results.

Session 10: Markov Models – Probabilistic Sensitivity Analysis 2

Building on the previous one, this session will expand on the setup of the probabilistic sensitivity analysis by examining how to choose and use parameters relating to cost and utility. By the end of the session, participants will have the practical skills and knowledge needed to correctly setup a PSA, and will have a deeper understanding of the robustness and reliability of healthcare decision models when confronted with uncertainties in cost and utility estimations. Participants will explore the range of outputs generated by PSA, the distribution of the results and their implications for decision-making. The session will address common challenges in PSA, such as interpreting scatterplots and calculating Incremental Cost-Effectiveness Ratios (ICERs).

Session 11: Markov Models – Probabilistic Sensitivity Analysis 3

This session will focus on additional topics relating to PSA outputs, such as Lambda values and Cost-Effectiveness Acceptability Curves. Participants will learn how to implement and interpret Lambda values. The session will provide a comprehensive understanding of Cost-Effectiveness Acceptability Curves, enabling participants to assess the likelihood of a healthcare intervention being cost-effective across varying willingness-to-pay thresholds. Additionally, participants will explore the concept of Acceptability Frontiers, which helps decision-makers identify the range of scenarios where interventions are likely to be cost-effective.

Session 12: Decision Uncertainty

This session will address the importance of decision uncertainty in HTA. Participants will explore the potential costs associated with making incorrect decisions and the concept of Value of Information (VOI). Specific VOI components, such as Expected Value of Perfect Information (EVPI), Expected Value of Partial Perfect Information (EVPPI), and Expected Value of Sample Information (EVSI), will be discussed, including their role in decision-making under uncertainty.

Session 13: Introduction to Modelling in R

This session will introduce participants to the use of R Programming Language for modelling in HTA. Participants will learn the basics of using R for modelling purposes. The session will cover the advantages and disadvantages of using R for economic evaluations, and it will present useful resources and packages to adapt the model used throughout the course as an example from MS Excel to R.

Session 14: Use of Real-World Evidence for decision-making 1

Following the information provided in sessions 12 and 13, analytical approaches for incorporating Real-World Evidence (RWE) into HTA will be explored through case studies and practical examples, due to its growing relevance in evidence-based decision making.

Session 15: Use of Real-World Evidence for decision-making 2

This session is a continuation of session 14, with additional examples and exercises relating to the use of RWE in HTA.

Session 16: Use of Real-World Evidence for decision-making 3

This session is a continuation of session 14 & 15.

Session 17: Current methodological debate in HTA

The final two sessions will engage participants in a discussion of ongoing methodological debates within the field of HTA. Topics will include cost-effectiveness thresholds, opportunity cost and budget considerations, spill over effects of healthcare interventions, and the balance between equity and efficiency in healthcare decision-making. Participants will learn of the still-evolving landscape of HTA methodology and the challenges facing decision-makers in today's healthcare systems.

Session 18: Current methodological debate in HTA

This session is a continuation of session 17.