Parallel Short Course 6

MODELING APPROACHES FOR ANALYSING HEALTH CARE PROBLEMS – AN INTRODUCTORY OVERVIEW AND COMPARISON

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Course Level: Beginner

This course will be useful for those not familiar with simulations and for those who are already experienced in one or two methods, but want to look 'outside the box.

Description:
This course provides an overview of various approaches:
1) Decision trees (DT)
2) Markov Models (MM)

3) Microsimulation

4) Discrete-Event-Simulation (DES)

5) Agent-based Models (ABM)

6) System Dynamics (SD). It provides a unique opportunity to gain insight into alternative modeling techniques and discuss model selection with the several experts. This course will also consider the new results and best practice recommendations of the ISPOR-SMDM Joint Modeling Good Research Practice Task Force.

It starts with a short introduction to decision-analytic modelling. Alternative modelling approaches will then be introduced in five sections, each followed by an interactive discussion.

Session_1 This session covers DT and MM (cohort simulation), two widely used methods. MMs are based on a set of health states (state-transition models) and have been applied in decision analyses addressing questions about prevention, diagnosis and chronic diseases.

Session_2 The application of microsimulation in decision analysis allows investigators to model individuals and evaluate heterogeneous populations. Approaches range from state-transition models to DES and equation-based models. This session gives a general introduction based on their applications in the social sciences, health care and politics.

Session_3 DES is a microsimulation method in which entities (e.g., patients) interact and compete for resources (e.g., hospital beds or organ transplants). We will cover the primary components of DES such as entities, attributes, resources, and queues.

Session_4 ABM is a new approach to modelling autonomous, interacting agents. The fundamental feature of an agent is the capability to make independent decisions. ABMs have been used to examine economic issues and questions in the areas of emerging behaviour and epidemiology. We will cover the role of agents as active model components.

Session_5 SD is a powerful modelling method that involves both qualitative and quantitative approaches. It takes a "whole system" view, demonstrating how a small change in one part of a system can have major unanticipated effects elsewhere, an aspect that is particularly suitable for healthcare applications.