Applied Epidemiology:
The Evaluation of Medical Tests

Description

Modern medicine relies on lab tests, imaging, and other forms of medical tests to find out more about the likely cause of a patient's condition, to predict the future course of disease, or to select and monitor treatment. Like other interventions in healthcare, medical tests should be thoroughly evaluated before they can be given access to the market, be reimbursed, and recommended in practice guidelines.

Unfortunately, the evaluation of medical tests has received far less attention than the methods for evaluating pharmaceuticals and other interventions. It is now always clear what the best approaches are for evaluating the clinical performance of medical tests, or the best strategies for estimating their clinical effectiveness. This absence has generated interesting methodological developments, while awareness is increasing among epidemiologists.

In this course, we will give an overview of current concepts and modern methods for evaluating medical tests. As guiding principle, we take the premise that decisions about tests are now based on the effect that they have on patient outcomes – clinical effectiveness – and that measures of the clinical performance of tests should be informed about the effectiveness.

The course will look specifically at a few purposes for medical testing: diagnosis, prognosis, treatment selection, and screening. We will distinguish between the scientific validity of medical tests, the technical and analytical performance, the clinical performance, and the clinical effectiveness and clinical utility. We will also discuss the evaluation of multivariable models for prediction.

We rely on a combination of online lectures and assignments, with background reading material.

Patrick M. Bossuyt

is the professor of Clinical Epidemiology at the Amsterdam University Medical Centers, where he leads the Biomarker and Test Evaluation research program. The BiTE program aims to appraise and develop methods for evaluating medical tests and biomarkers, and to apply these methods in relevant clinical studies. In doing so, the program wants to strengthen the evidence base for rational decision-making about the use of tests and testing strategies in health care. Bossuyt spearheaded the STARD initiative for the improved reporting of diagnostic test accuracy studies. Dr Bossuyt has authored and co-authored several hundred publications in peer reviewed journals and serves on the editorial board of a number of these, including Radiology and Clinical Chemistry. For 10 years he has chaired the Scientific Advisory Committee of the Dutch Health Insurance Board, which oversees the health care benefits covered in the national insurance program.

SCHEDULE

MONDAY

Session 1:
A general framework for the evaluation of biomarkers and medical tests

Session 2:
Evaluating the analytical and technical performance of medical tests

TUESDAY

Session 3:
Clinical performance – *diagnostic tests*: questions, metrics, and study design

Session 4:
Clinical performance – *diagnostic tests*: sources of bias and variability

WEDNESDAY

Session 5:
Clinical performance – *prognostic tests*: questions and study design

Session 6:
Clinical performance – *screening tests*: questions and study design

THURSDAY

Session 7:
Clinical performance – *predictive tests*: questions and study design

Session 8:
Clinical effectiveness – randomized trials of medical tests