

PRIVAT DOCENT COURSE

Systematic reviews and meta-analyses of diagnostic studies: a practical guideline.

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Program of the lessons

Lesson 1 (Inaugural lesson)

Introduction to systematic reviews and meta-analyses of diagnostic studies

May 14th, 2018 / 13:30 - 14:15 [1 hour]
Auditoire Mathias Mayor, CHUV

Lesson 2

*Review question and search strategy for systematic reviews and
meta-analyses of diagnostic studies*

May 14th, 2018 / 14:45 - 16:00 [2 hours]
Auditoire Mathias Mayor, CHUV

Lesson 3

*Selection, data extraction and quality assessment of studies included in
a systematic review or meta-analysis of diagnostic tests*

September 24th, 2018 / 13:30 - 16:00 [3 hours]
Auditoire Charlotte Olivier, CHUV

Lesson 4

*Pooled analysis, evaluation of heterogeneity and biases, and preferred reporting
of systematic reviews and meta-analyses of diagnostic studies*

December 3rd, 2018 / 13:30 - 16:00 [3 hours]
Auditoire Charlotte Olivier, CHUV

Summary of lessons

Lesson 1 (inaugural lesson)

Introduction to systematic reviews and meta-analyses of diagnostic studies

Summary

A systematic review attempts to collate all empirical evidence that fits pre-specified eligibility criteria in order to answer a specific research question. It uses explicit, systematic methods that are selected with a view to minimizing bias, thus providing more reliable findings from which conclusions can be drawn and decisions made. Meta-analysis is the use of statistical methods to summarize the results of independent studies. Systematic reviews and meta-analyses of diagnostic studies are very useful for approval of new diagnostic methods, health technology assessment (HTA) reports, planning new studies and evidence-based guidelines.

Lesson 2

Review question and search strategy for systematic reviews and meta-analyses of diagnostic studies

Summary

The first step of a systematic review/meta-analysis of diagnostic studies is formulating a clear review question and planning eligibility criteria. Components of a review question for systematic reviews/meta-analyses of diagnostic studies include: participants, index test, target condition and reference standard.

Conducting a comprehensive, objective and reproducible search for studies to determine the diagnostic accuracy of tests is a vital and challenging task in preparing a systematic review or a meta-analysis of diagnostic test accuracy. Sources include bibliographic databases, journals and other non-bibliographic-databases, unpublished and ongoing studies. Currently, a search strategy to identify studies for a systematic review of diagnostic test accuracy will typically have two sets of terms: terms to identify the index test(s) under evaluation and terms to search for the target condition(s) to be detected.

Lesson 3

Selection, data extraction and quality assessment of studies included in a systematic review or meta-analysis of diagnostic tests

Summary

The findings of a systematic review or meta-analysis of diagnostic studies depend critically on decisions relating to which studies are included, and on decisions relating to which data from these studies are presented and analysed. Methods used for these decisions must be transparent, and they should be chosen to minimize biases and human error. Assessment of eligibility of studies, and extraction of data from study reports, should be done by at least two reviewers, independently.

All relevant data should be extracted from the included studies. Detailed information regarding the study population, methods of the diagnostic test, reference standard, outcome variables such as true positive, true negative, false positive and false negative cases should be extracted. Extraction of data should be as complete as possible in order to allow reconstruction of 2×2 diagnostic tables as well as sub-group analyses.

The assessment of methodological quality of studies included in a systematic review or meta-analyses of diagnostic studies is a necessary step to guide the analysis and interpretation of the results. Two of the most commonly used checklists for the quality assessment are: Oxford Center for Evidence Based Medicine worksheet for diagnostic studies and Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2).

Lesson 4

Pooled analysis, evaluation of heterogeneity and biases, and preferred reporting of systematic reviews and meta-analyses of diagnostic studies

Summary

Diagnostic test accuracy may be evaluated across a number of studies; to improve the precision of the estimate, it may be desirable to combine data from a number of studies in a meta-analysis. Meta-analysis is a special statistical method for pooling data across different studies and giving pooled diagnostic indices. For this purpose, a weight is attributed to each study and the weighted diagnostic indices are pooled together. Statistical software are available for this purpose, including SAS, R, STATA, and Open Meta-analyst.

The hierarchical summary receiver operator characteristic (HSROC) and bivariate random-effects techniques are considered the most appropriate methods for pooling sensitivity and specificity from multiple diagnostic test accuracy studies. Both approaches take into account any correlation that may exist between sensitivity and specificity.

Numerous sources of bias can affect the summary estimate of diagnostic test accuracy: publication bias, heterogeneity, spectrum bias, verification bias, choice of cut-off points for dichotomising a test result. The accuracy reported in studies can also be influenced by underlying disease prevalence, dependence between combined tests, and missing data. When conducting a meta-analysis, potential sources of bias should be identified and investigated in terms of how they influence the summary estimates of diagnostic test accuracy.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist provides a minimum requirement for reporting systematic reviews and meta-analyses.