Systematic Reviews of Diagnostic Test Accuracy

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WHY?

HOW?
Why reviews?

- Test development increases
- Patients ask more reassurance
- More tests available
- Greater choice

But also:
- Higher costs
- Higher burden on society
- Difficult to choose
Why Systematic Reviews?

- Scientific summary of all available evidence
- Transparent and reproducible process
- Minimizes bias
- Studies can be formally compared to establish generalisability and consistency
- Heterogeneity can be identified and investigated
- Quantitative part (meta-analyses) may increase the precision of the overall result
Why diagnostic test accuracy?

- Practical reasons
  - Studies are easy to undertake
  - Sample sizes required are feasible
  - Answers can be obtained quickly
  - Results do not depend too much on human and health service factors

- RCTs of test strategies suffer from all these problems, and are rarely completed

- Methods to meta-analyze accuracy data have been developed
Limitations of test accuracy?

- “How well the test identify the target disorder?”
  - Does not directly assess effect of test on outcomes
  - Does not directly answer the question of whether using a test does more good than harm
  - Only possible when there is an adequate reference standard
How should test accuracy be used?

- To identify the best tests

- To identify the best use of tests
  - Replacing
  - In combination
  - In sequence

- Probabilistic thinking

- Combining with evidence of treatment effects in decision models
This was why, now comes how...
Steps in a Systematic Review

1. Question formulation
2. Identification and selection of studies
3. Quality assessment
4. Data analysis
5. Interpretation of results
1. Question formulation

Objective of a DTA SR can be

- To make comparisons between tests concerning their global accuracy
- To estimate the accuracy of a test operating at a particular threshold
- To understand why results of studies vary
Components of a question

- For intervention reviews
  - Patients
  - Intervention
  - (Comparative intervention)
  - Outcome
Components of a question

- For diagnostic test accuracy reviews
  - Patients
  - Index test
  - (Comparator test)
  - Target disorder
Components of a question

- For diagnostic test accuracy reviews
  - Patients
  - Presentation
  - Prior tests
  - Index test
  - (Comparator test)
  - Purpose
  - Target disorder
  - Reference standard
2. Identification of studies

Problems in indexing of DTA studies

- No study design terms (MeSH: sensitivity-and-specificity)
- Diagnostic search filters based on terms used to report results
- Filters don’t work (loss of relevant articles and not reducing NNR)

Search Strategy: include elements for

- target condition AND index test
- (more titles to screen)
3. Quality assessment

○ Relation between quality items and bias is not as straightforward as it is for interventions

○ Many more items: 11 mandatory and >10 facultative (QUADAS checklist)

○ Main issues:
  ● patient population
  ● verification issues
  ● blinding
3a. Data collection

- Assessment of study quality
- Data analysis and synthesis
- Investigations of heterogeneity
- Sensitivity analysis
- Assessment of reporting bias

- Data extraction Form
- Procedure for handling disagreements
4. Data analyses
Data and Analysis: challenging

- Outcome measure: paired.
  - Sensitivity and specificity
  - Pos and neg predictive values
  - Pos and neg likelihood ratios

- Cut-off problems
  - Explicit
  - Implicit

- Heterogeneity is rule rather than exception
  - Issues of bias
  - Different study designs
5. Interpretation of the results

- What do the results mean?
- How trustworthy are they?
- Any questions remaining?
Steps in a Systematic Review

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2. Identification and selection of studies
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5. Interpretation of results
How does this look like in the end?

- **Background**
  - Introduction to the subject
  - Objectives / research question

- **Methods**
  - How and where did you search
  - How did you assess quality
  - How did you analyze the data

- **Results**
  - What are the results of the search, quality assessment and analyses

- **Discussion**
  - What do the analyses mean
  - Limitations
  - Implications