Statistical methods for updating meta-analyses: An example of methods evaluation

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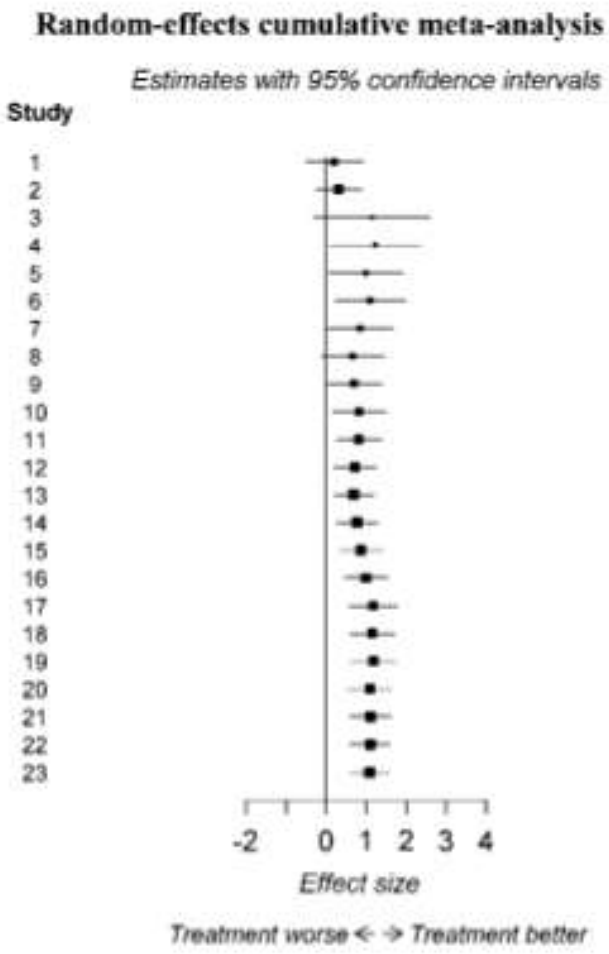
Updating Cochrane reviews

- Reviews need to be updated as new studies on the topic emerge
  - How often?
  - Will conclusions change?
  - Can we ever stop?

- Meta-analyses will need to be updated

Updated meta-analyses: risk of error

Number of updates	Type I error rate
Initial review	5%
1	9.8%
2	14%
5	26%
10	43%



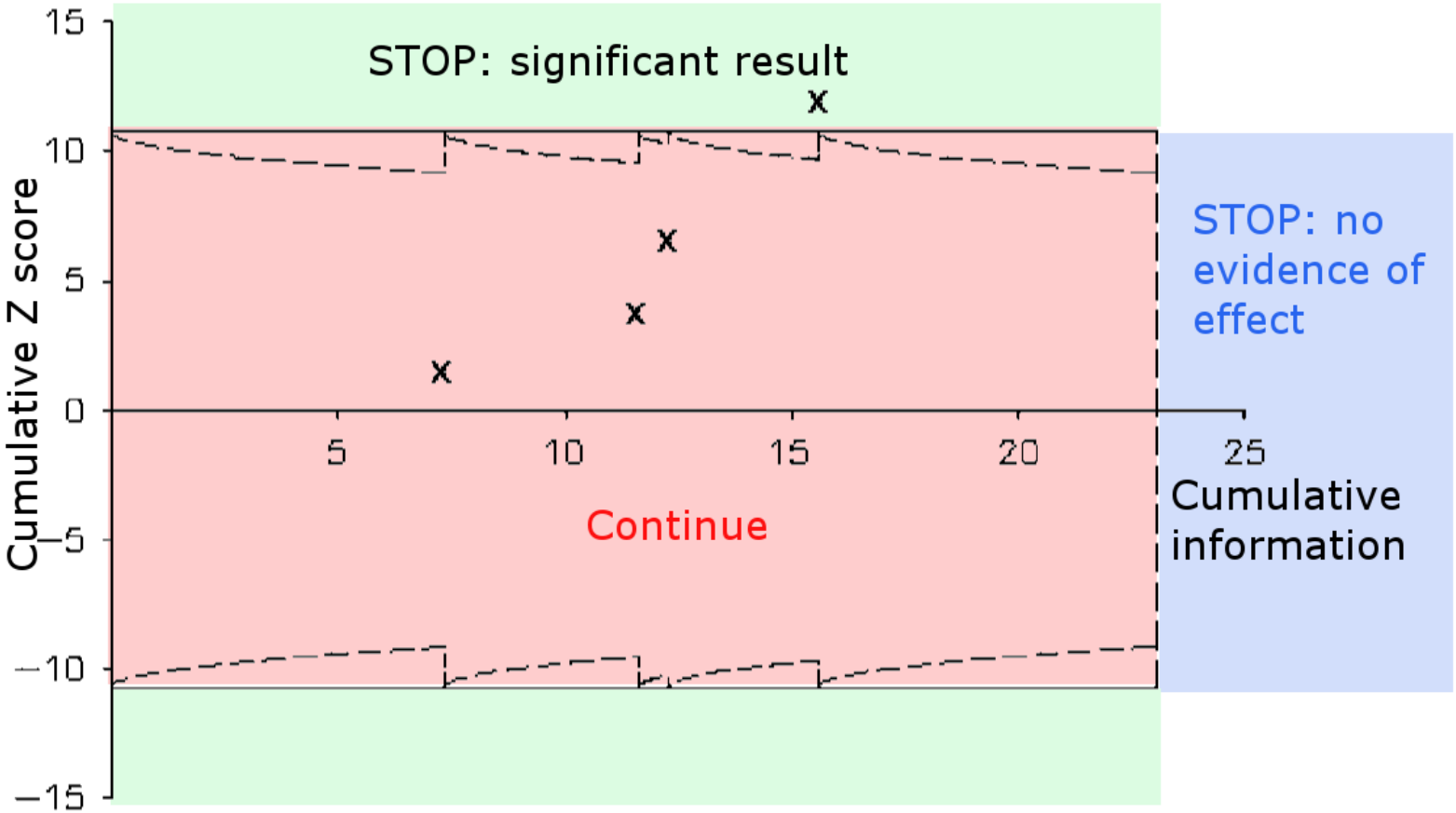
Statistical methods for updating

- Two identified

1. Sequential Meta-Analysis
   - Higgins, Whitehead, Simmonds
2. Trial Sequential Analysis
   - Thorlund, Wetterslev, Brok

- Both adapted from sequential clinical trial analyses

Sequential meta-analysis



Evaluating the methods: 1) Search

- Aim to identify all methods for updating meta-analyses

- Intensive search process
  - Citation based
  - “Snowballing search” from known papers

2) Implementation

- Create software to run all identified methods
  - In R for this project
  - Could they be put in RevMan?

- Are the methods practical? Fast? easy to use?

3) Testing and comparison

- Run a large-scale simulation study

- *Do methods avoid false-positives?*
- *How do the methods compare to each other?*
- *How much better than a "naïve" approach are they?*

4) Real world application

- Test the methods on existing meta-analyses
- Use updated reviews in the Cochrane library

- *When do using these methods lead to different findings?*
- *When are the methods not needed?*

5) Guidance

- Discussion forum
  - *Present findings*
  - *Elicit opinions*
- Written guidance
  - *When are new methods required?*
  - *When are standard approaches acceptable?*
  - *How/when should reviews be updated?*
- Software
  - *Software to perform analyses*
  - *Software to aid decision making*