WHEN & HOW TO UPDATE SYSTEMATIC REVIEWS: A METHODOLOGICAL SYSTEMATIC REVIEW

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Funded by:  
Canadian Agency for Drugs and Technologies in Health  
CHALMERS RESEARCH GROUP
IMPORTANCE OF SRs

- Commissioning agencies and other groups are investing in SRs
- Healthcare professionals increasingly rely on results of SRs
- About 2500 new SRs published annually (Moher et al., In revision)
- The development of CPGs often involves evidence from SRs
- Utility of SRs optimal when kept up-to-date
WHY THERE IS A NEED TO UPDATE?

New evidence

- Emergence of new interventions and new outcomes
- Studies of new populations
- Knowledge on benefits/harms of existing interventions may change
- Obtain missing/more detailed data (contacting authors of primary studies)

Consequences

- SRs not incorporating new evidence may not be valid
- CPGs misleading if based on outdated evidence
STRENGTHS OF UPDATING

- Keeps users up-to-date with new developments (e.g., new interventions, outcomes) in a given field
- Monitors changes of the effect of intervention (by adding new studies)
- Minimizes the impact of publication bias due to delayed publication or unpublished literature
- Reduces statistical/clinical uncertainty
- Allows to extend the search strategy (additional databases/other sources)
CHALLENGES RELATED TO UPDATING

- How to update (protocol, update search, statistical considerations)
- When to update (frequency, timing, fast/slow evolving fields, efficiency)
- Inconsistent perception of updating process (non-comparability across surveys of updating practices, prevalence of updated SRs)
- Cost, time, feasibility
Rationale for SR

- No SR of methods/strategies for updating SRs
- Bring some clarity to the topic and identify gaps in knowledge
- Provide more guidance to systematic reviewers and agencies
- Help to develop effective guidelines for updating SRs

Study objectives

To systematically summarize evidence of methods for updating SRs by addressing two questions:

1. When to update SRs and
2. How to update SRs
WHAT IS AN UPDATE?

Working definition

A discrete event aiming to search for and identify ‘new evidence’ to incorporate it into a previously completed systematic review

- The central element - an effort to search for ‘new evidence’
- Even if no ‘new evidence’, still an update
- Modifications, without initiating a new search, not an update:
  a) Corrections of errors
  b) Re-analysis using modified/new methodology (e.g., statistical pooling)

Search strategy/sources and data extraction


- Cross-sectional sample of SRs (n = 297) indexed in MEDLINE November 2004 to identify updated SRs reporting or describing any method/strategy for updating

- 15-item extraction form
SR: WHEN AND HOW TO UPDATE

Identified and included methods/strategies

Search and screening results

- Total of 2548 records (titles and abstracts) identified and screened
- 15 records included (7 methods/strategies)
  - Statistical methods (n = 2)
  - Strategies (n = 5)

Sample of SRs (n = 297) indexed in MEDLINE (Nov. 2004)

- Updated SRs (n = 54)
- None of the 54 SRs reported any methods/strategies for updating
- All 54 updated SRs were excluded
Cumulative meta-analysis (CMA) (Baum 1981, Lau 1992)

- A statistical procedure in which the pooled effect estimate is sequentially updated by incorporating results from each newly available study.
- Defined as “a product of performing a new meta-analysis every time a new relevant trial is added to a series of trials”.
- Updating mechanism; up-to-date information, exploratory tool; early detection of benefit/harm; stopping ongoing/planning future trials.
- Not efficient (update whenever a new study emerges); inflated type I error; publication bias.
Methodological extensions of conventional CMA

- **Using cumulative slope as an indicator of stability (Mullen 2001)**
  - Least-squares regression line to explore the stability of effect size
  - The slope magnitude close to 0 - stable effect size – no updating
  - Arbitrary; 'no rule of thumb'; SE of slope invalid

- **Using sequential monitoring boundaries (Pogue 1997)**
  - Lan and DeMets $\alpha$-spending functions to minimize type I error
  - Prior knowledge of the N of the planned tests not required
  - Requires larger amount of data than conventional CMA

- **Recursive CMA (Ioannidis 1999)**
  - Update with a new study/follow-up/more accurate/unpublished data
  - Assess the impact of missing data or publication bias at each step
  - Costly; accuracy of obtained data need to be checked
Test for identifying ‘null’ MA that are ripe for updating

(Barrowman 2003)

- Identify a null MA that is out of date (i.e., NS result would be overturned)
- Assumes that the pooled effect is NS due to insufficient power
- How many additional subjects are needed to overturn the NS into a S result?
- The observed and predicted numbers of additional subjects compared
- Efficient in determining the proper timing for an update
- Application to a MA of small trials may generate invalid results
SR: WHEN AND HOW TO UPDATE

Strategies for updating SRs (n = 5)

1. Steps in maintaining an updated review (Chalmers 1993)
   - Updating strategy for SRs of RCTs evaluating effects of perinatal care (7 steps)
   - Identification, retrieval, and incorporation of new information; dissemination

   - When registering SRs, authors agree to keep them up-to-date/electronic format
   - Periodic (every 2 years) updating of literature search recommended/last search date

3. Assessment of the need to update (Lutje 2005)
   - 2-step strategy and algorithm of administrative actions needed for updating
   - Decisions based on editorial consensus: a) is SR up-to-date? b) importance of topic

4. Strategies for updating a review (Weller 1998)
   - Broadly applicable strategy that considers PH importance, availability of resources
   - Clinical outcomes (short-/long-term), health care field (fast/slowly evolving)

5. In-process citations for updating a review (Bergerhoff 2004)
   - MEDLINE OVID search by ‘entry date’ vs. ‘publication year’ yields additional records
Conclusions

- Identified 2 statistical methods and 5 strategies for updating SRs
- Conduct of CMA and its extensions costly/time-consuming; Barrowman’s method efficient, but purely statistical; not commonly used
- 5 strategies are either arbitrary, not likely efficient, or not pragmatic; not clear how they would work in practice (not formally tested)
- Importance of updating SRs not well recognized; paucity of updating methods contrasts with quantity of other methodological developments in field of SRs (e.g., publication bias, variance imputation)
- In a recent MEDLINE survey, non-Cochrane reviews accounted for about 80% of all published reviews in November 2004; only about 3% were updated vs. 38% of Cochrane reviews (Moher et al., In revision)
- Cochrane Collaboration and UK’s NICE routinely update SRs
Future research and activities

- More investments should be made available to investigate issues surrounding methodology of updating SRs
- Efficient yet comprehensive policies for updating SRs are needed
- Updating process should ideally consider clinical questions, search strategy, public health importance, and statistical techniques in order to accurately reflect the complexity of ever evolving evidence
- Exploring cost-effectiveness of alternative updating techniques or application of methods developed in other fields
- International harmonization of aspects related to updating of SRs
- Electronic publishing formats
Editorial processes and supporting reviewers

Chair: Harriet MacLehose

Lansdowne