Workshop 12 — Appraising a systematic review with meta-analysis

As mentioned in the previous workshop, a systematic review is not infrequently used as the first stop when retrieving information from the literature to address a defined question. Hence, acquiring the skills for appraising a systematic review appears essential for evidence-based medical practice. Regrettably, the less straightforward statistical techniques often used in meta-analyses can be intimidating to the average clinician, with the end result that either everything presented in a meta-analysis is trusted as truth (as advised and advocated by some ‘authorities’) or that the meta-analysis is simply neglected. The latter is liable to occur if the results contradict the personal experience of the clinician, especially when the meta-analysis is prepared by non-clinicians. Neither is desirable in the practice of evidence-based medicine.

Admittedly, appraising a systematic review with a meta-analysis is no easy task. First, one must have acquired the skills for appraising individual primary studies. The purposes of the critical appraisal are common, that is to ensure that the results arising from a meta-analysis are clinically important and can be applied in one’s own clinical setting. Of course, before contemplating applying the results, one must ensure that they are important, valid, and reasonably precise. In this Workshop, a similar approach will be taken to addressing the four major questions in appraising a systematic review with meta-analysis.

(1) Are the results of clinical and/or public health importance?
As systematic reviews can be conducted in all the four major areas of clinical activities (diagnosis, therapy, prognosis, and harm/causation), the specific questions on clinical and/or public health importance may be worded differently.

(2) Are the results basically valid?
The very nature of a systematic review with meta-analysis dictates that its results may be heavily subject to different sources of bias, including those present in the primary studies incorporated into the meta-analysis. The specific questions to be answered for ascertaining the validity of study results in a systematic review are structured under the three major sources of bias (Box). Furthermore, heterogeneity among...
primary studies can create problems in summarising results.

(3) Are the results reasonably reliable?
Meta-analyses are usually performed with easily accessible software on the web and the 95% confidence intervals (CIs) of the summary effect measures are automatically generated. One of the benefits of meta-analysis is that the summary effect measure usually has greater precision than those of its individual studies, but one must still examine whether the 95% CI overlaps with the null value of difference between the groups being compared. Overlapping suggests that no conclusion can be drawn regarding the association and could have happened either when there is no actual association between the exposure/treatment and the outcome (with a narrow enough CI), or as happens not infrequently the meta-analysis is conducted prematurely and has a wide 95% CI.

(4) Can the results be applied in another setting?
It goes without much emphasis that the demographic and/or clinical backgrounds of subjects should be considered. Heterogeneity of effects among subjects with different background, if identified, should provide guidance for actual applicability in different settings. The utility of results also depends on the background risk of the disease. This is pertinent to estimating the positive/negative predictive value for a screening/diagnosis test, and the number needed to treat for therapy. The prevalence of a specific exposure (in estimating preventable disease burdens) in the population for applying the results, as well as the incremental benefit over the incremental cost and harm for any contemplated intervention, would also affect utility.

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References