Egyptian Journal of Surgery Vol 24, No 4, Oct., 2005

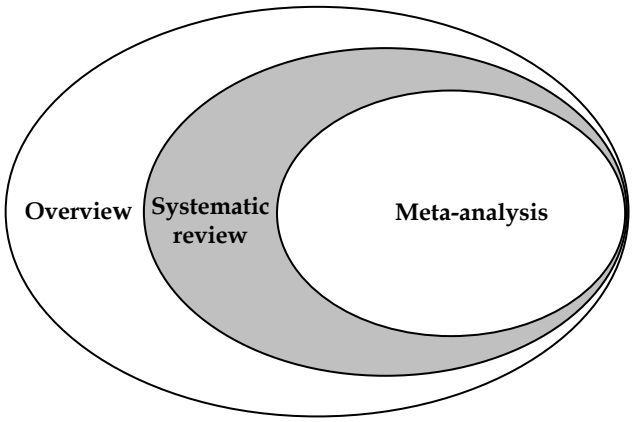
PROFESSIONAL DEVELOPMENT

How to appraise a review article

By
Egyptian Group for Surgical Science and Research
Said Rateb, EGSSR Moderator
Nabil Dowidar, EGSSR Secretary General
Mohamed Farid
Ahmed Hussein
Ahmed Hazem

INTRODUCTION

One area of confusion is the distinction between review (overview) articles, systematic reviews, and meta-analyses. The diagram below illustrates their relationship.



Review (overview) articles are the broadest category. Most review articles are unsystematic, because the author does not look at all of the evidence. A systematic review has a formal approach to gathering, evaluating, and presenting the evidence. Some systematic reviews are meta-analyses; a meta-analysis goes the final step by using formal statistical methods to calculate a summary result or results.

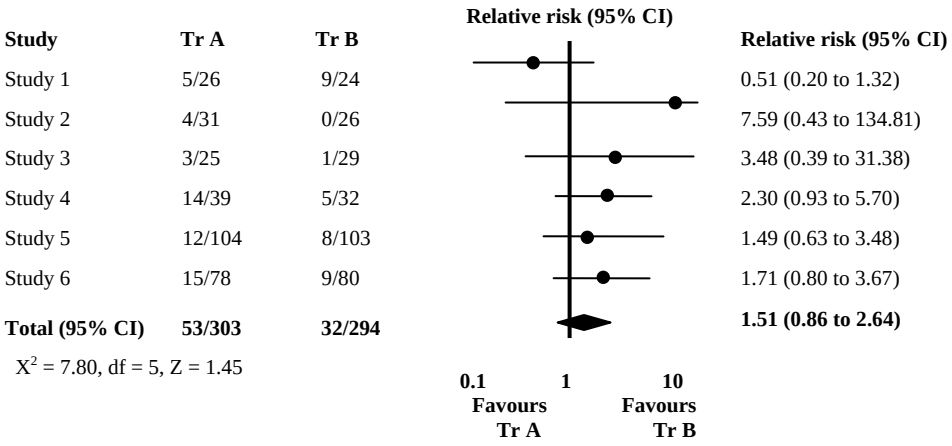
There are two major reasons to do a meta-analysis:

1. To quantitatively combine the results of previous studies to arrive at a summary estimate.
2. As a "study of studies", to help guide further research and identify reasons for heterogeneity between studies.

Meta-analyses of the first kind can help resolve medical controversies caused by conflicting studies, are an inexpensive alternative to very large randomized trials, and can in this way shape health policy. The second kind of meta-analysis is particularly useful for designing future studies, by systematically identifying key patient and study characteristics from previous work.

HOW DOES A META-ANALYSIS LOOK LIKE?

A good meta-analysis is often easier for the non-statistician to understand than the group of primary research papers from which it was derived. The results of a meta-analyses tend to be presented in a fairly standard pictorial form known as a "forest plot'' in which the pooled odds ratios of a specific outcome such as morbidity or mortality of the group of primary research, usually randomized controlled trials, are plotted.



Each horizontal line in the plot corresponds to the relative risk of a specific outcome at a specific time period for one of the trials included in the meta-analysis. The "circle" in the middle of each line is the point estimate of the difference between the two treatment groups of each randomized trial and the width of the line represents the 95% confidence interval of this estimate. The black line down the middle of the picture is known as the "line of no effect," and in this case is associated with a relative risk of 1.0.

If the confidence interval of the result (the horizontal line) crosses the line of no effect (the vertical line), this means that there is no significant difference between the two treatments of the corresponding trial. A "diamond" below all the horizontal lines represents the pooled data (overall relative risk) from all trials included in the meta-analysis. If the diamond firmly overlaps the line of no effect, we can say that there is difference between the two treatments in terms of the primary end point (a specific complication or death).

APPRAISAL POINTS

It essential for every surgeon to have the necessary skills to critically appraise systematic reviews and meta-analysis. This is achieved through assessing the validity and importance of the results presented in such reviews through the following questions.

IS THE STUDY VALID?

1. **Did the authors ask a focused question?**
   A focused question is the base of a good meta-analysis. The question should be specific and of the foreground type covering patient characteristics, exposure / intervention and outcome.

2. **Were the criteria used to select articles for inclusion appropriate?**
   Inclusion criteria can include criteria involving the treatment, patient population, study design, and diagnosis.
   Possible problems include:

- poor description of treatment (did they lump together low and high dosages of a drug, some of which may be adequate and others may not?)
- studies of poor quality included along with those of higher quality?
- vague or variable description of condition being treated (for example, in studies of surgical site infection there are many ways to define infection).

3. **Is it unlikely that important, relevant studies were missed?**
   Remember, just using MEDLINE may not be adequate, and a meta-analysis may be more convincing if it includes unpublished trials and studies from the Cochrane Controlled Trials Register which don't appear in MEDLINE.

4. **Was the validity of the included studies appraised (study quality)?**
   Assessment of study quality means that the authors carefully read each study, and rated it on a number of quality measures. Important aspects of quality for an RCT include:

   - was it blinded?
   - was it placebo-controlled?
   - was it randomized?
   - was follow-up complete?

   In addition, do the authors of the meta-analysis use this information? For example, do they drop studies which don't meet a certain minimum level of quality, or do they calculate results for high-quality studies separately from those for all studies or low-quality studies?

5. **Were assessment of studies reproducible (data abstraction)?**
   There should be a description of how data were abstracted. Ideally, at least two people should abstract each study, then compare results and have a formal mechanism for resolving conflicts.

6. **Were the results similar from study to study (homogeneity)?**
   When study results are homogenous, using a Q statistic or chi-square test, it is much more likely that the meta-analysis reflects "the truth". When studies are heterogeneous (i.e. some find benefit, some do not) the authors should be very cautious about combining the results, and if they do should use a random effects model.

ARE THE RESULTS IMPORTANT?

1. **Would the results change my practice?**
   This question must be answered by the individual clinician. A meta-analysis which confirms existing practice need not be subjected to rigorous evaluation, since they results don't change what you are already doing. On the other hand, if the results would change what you do for your patients, it is incumbent on you to take the next step.

2. **Are the outcomes important to my patients?**
   Most meta-analyses use patient-oriented outcomes such as morbidity, mortality, and symptoms. However, if a study uses surrogate or intermediate outcomes such as FEV1 or hemoglobinA1C, the results should be interpreted cautiously. Proponents of the use of POEMs would argue that if a meta-analysis does not use patient-oriented outcomes, you don't have to proceed to the next step.

   POEM - Acronym which stands for "Patient Oriented Evidence that Matters".
   Term used to describe the kind of article that is most relevant for physicians to know about, because it uses patient-oriented outcomes, deals with a problem that we see in our practice, and has the potential to change the way we practice.

   DOE - Acronym that stands for "Disease Oriented Evidence".
   Term used to describe the kind of article that is least relevant for physicians to know about, because it uses intermediate or disease-oriented outcomes. This kind of evidence should not change or guide practice because it is premature.