Cochrane
Effective Practice and
Organisation of Care

Synthesising results when it does not make sense to do a meta-analysis

See also: Analysis in EPOC reviews.

In EPOC reviews, it often does not make sense to undertake a meta-analysis with the aim of calculating an average effect. Suggestions regarding how to approach an analysis when it does not make sense to do a meta-analysis are provided below.

Terminology and reasons for not calculating an average effect across studies

A variety of terms are sometimes used to describe analyses in reviews when statistical methods (meta-analyses) are not used. These include 'qualitative synthesis' and 'narrative synthesis'. Neither of these terms are well defined or appropriate in the context of reviews of effects, which are rarely, if ever, non-quantitative or based on words or telling a story. An alternative term that can be used, if needed, is a 'structured synthesis'. This term can be used whether meta-analysis is used for some comparisons and outcomes or not at all.

The analytic approach to a review of effects is similar with or without the use of meta-analysis, the difference being that statistical methods are not used to summarise the results in the former.

Reasons for not calculating an average effect across studies include:

- Missing information (e.g. unit of analysis errors and no reported intra-cluster correlations (ICCs) in reviews of cluster randomised trials
- Unexplained heterogeneity that make the average effect difficult to interpret and potentially misleading
- Differences in populations, interventions, comparisons or methods that would make the average effect across studies meaningless

Descriptions of the intervention and how the intervention might work

These two Background sections should provide the basis for synthesising the results of a review (whether meta-analysis is used or not), when relevant, by:

- Providing a logical conceptual framework for grouping together interventions that might be expected to work in the same way and have similar effects
- Providing a logic model that includes intermediary outcomes
- Providing background information (indirect evidence) supporting hypotheses about factors that might explain differences in results (See What are explanatory factors and why should they be included in protocols?)

Suggested citation: Cochrane Effective Practice and Organisation of Care (EPOC). [Title]. EPOC Resources for review authors, 2017. epoc.cochrane.org/resources/epoc-resources-review-authors (accessed DD Month YYYY)

Objectives
The objectives should include a list of the main comparisons that will be included in the review. This should flow from the conceptual framework in the Background (whether meta-analysis is used or not).

Data extraction and management
Each key explanatory factor that will be considered should be described here, including how each factor will be coded (whether meta-analysis is used or not).

Measures of treatment effect
Studies included in EPOC reviews will frequently report outcomes that are similar but vary substantially. For example, a review may include a wide range of measures of:

- Different patient outcomes
- Utilisation of different types of services
- Quality of care

The first step in conducting an analysis, whether using meta-analysis or not, is to standardise outcome measures for each type of outcome. For example, dichotomous outcomes might be standardised as the proportion of:

- Patients experiencing morbidity
- Patients utilising services
- Professionals adhering to recommended practice

Continuous outcomes are more difficult to standardise and to interpret. Review authors considering options for standardising continuous outcomes (e.g. standardised mean differences) should have statistical support or consult their contact editor.
When collecting data from included studies, review authors should record results in natural units, as reported by the investigators, before standardising them.

Unit of analysis issues
If there is a unit of analysis error in the reported analysis for a study and there is insufficient information to reanalyse the results, review authors should contact the authors to obtain necessary data. If these data are not available, they should not use confidence intervals or p-values for which there is a unit of analysis error when synthesising the results of included studies. Options for synthesising results in these situations include:

- Imputing ICCs that can be used to adjust reported confidence intervals or p-values
- Weighting studies based on the number of clusters (e.g. health professionals) in each study
- Synthesising results – cautiously – without a measure of variance or precision for each estimate of effect

Dealing with missing data

Review authors should contact authors of included papers if other important data are not available. If they are not able to obtain missing data, they should report the results that are available, provided they are not likely to be misleading. Occasionally it may be possible to impute other data, such as standard errors, but this has rarely been done in EPOC reviews.

Data synthesis

Review authors should avoid vote counting; i.e. comparing the number of 'positive' results with the number of 'negative' results. (See 9.4.11 *Use of vote counting for meta-analysis* in the Cochrane Handbook) It also generally is not helpful to readers to simply report an inventory of studies by reporting the results of each study one at a time.

Options for reporting effects for interventions or groups of interventions when it does not make sense (or is not possible) to report an average effect across studies include reporting:

- Interquartile ranges
- Ranges of effects
- Plain language summaries (See Worksheets for preparing summary of findings tables using GRADE)

When there is low or very low certainty of evidence for the average effect across studies and low or very low confidence in subgroup effects, it can be misleading to report average effects across studies and consideration should be given to using one of the above approaches.

The synthesis can include an analysis of the mechanisms through which the interventions were intended to affect the outcome and postulated mechanisms for other effects, both intended and unintended, and the extent to which the data from included studies support or refute the hypothesised mechanisms. Such an analysis can be guided by a logic model.[1]

What is known about the effects of different types of interventions should be summarised within each category of interventions, including important interventions for which no evaluations are found.

The certainty of the evidence for estimates of effects should be graded using the approach recommended by the GRADE Working Group (see Worksheets for preparing summary of findings tables using GRADE), whether a meta-analysis is conducted or not.

In addition, review authors should identify important factors that should be taken into consideration by anyone contemplating implementing an intervention, including: possible trade-offs (of the expected benefits versus harms and costs), the certainty of the available evidence, possible differences in baseline risk and other important factors that might affect the translation of the available evidence into practice in specific settings (see Implications for practice).

Subgroup analysis and investigation of heterogeneity

Review authors should describe how variation in the questions asked by the included studies will be assessed. Sometimes it is possible to assess statistical heterogeneity (variation in the results of a group of similar comparisons) even when it does not make sense to estimate the average effect across the same group of studies (e.g. visually, using I^2, using a chi-squared test). For example, a primary objective of some EPOC reviews of implementation strategies has been to assess and explain variation in the effects of interventions such as audit and feedback, continuing education meetings,

or outreach visits on professional practice. In these reviews it has been possible to use statistical methods, including meta-regression, to explore heterogeneity, but it has not made sense to calculate an average effect of these interventions across different types of professionals, different interventions (e.g. differences in audit and feedback) and different types of professional practice. Other methods that have been used in EPOC reviews to assess heterogeneity include visual analyses of tables (including standardised measures of effect and key explanatory factors), bubble plots (where the size of the bubble corresponds to the number of healthcare professionals who participated) and box plots (displaying medians, interquartile ranges, and ranges).

Sensitivity analysis

Review authors should consider performing sensitivity analyses for missing data and the potential implications of missing information should be discussed, whether a meta-analysis is conducted or not (see Analysis in EPOC reviews). In addition, consideration should be given to conducting sensitivity analyses to assess how robust the synthesis is in relation to any assumptions that are made regarding the risk of bias for included studies and how to group studies. This can include recalculation of the interquartile range or range of effects, if relevant.

Summary of findings tables

Examples of summary of findings tables for syntheses when meta-analysis did not make sense are included in the EPOC worksheets for preparing a summary of findings using GRADE.

References

1. Anderson LM, Petticrew M, Rehfuess E, Armstrong R, Ueffing E, Baker P, et al. Using logic models to capture complexity in systematic reviews. Res Wyn Meth 2011; 2:33-42.