

Module 10: Planning the analysis

This module covers how you go about planning the analysis section of your review.

Learning objectives

- Be aware of the rationale for describing the analysis in advance
- Be able to derive the main comparisons from the review question
- Be aware of the different types of data that might be found in reviews
- Be able to state how a decision will be made on whether to perform a meta-analysis

Relevant sections of the *Cochrane Handbook for Systematic Reviews of Interventions*

- Chapter 9: Analysing data and undertaking meta-analyses

Where does this go in a Cochrane review?

- You will need to include a plan of analysis in the Methods section of your protocol.

Specifying your analysis in advance.....as far as possible

The final part of the Methods section in a protocol for a systematic review covers the plan of analysis. Ideally, you would tell the readers exactly what you are planning to do when you have collected all the study results together. This would mean that your analysis could not be influenced by the results you have looked at. In practice, it is not always possible to specify *everything* you will do in advance.

The compromise is to specify as much as possible in the protocol. Where you make decisions after seeing the study results, you should report exactly what you've done in the review, and usually present some analysis to show what would happen if you made a different decision.



Read [Chapter 9](#) of the *Cochrane Handbook for Systematic Reviews of Interventions*

Now would be a good time to read Section 9 of the *Cochrane Handbook for Systematic Reviews of Interventions*, which covers some issues in planning the analysis for your review.

Here's a checklist to use when writing the Methods section, followed by some practical tips

- What are the main comparisons in your review?
- For the outcomes you specified, how will you summarise the result for each study?
- How will you decide whether to combine the results of the separate studies?
- Do you plan any subgroup or sensitivity analyses?

Specifying the comparisons

This should be fairly easy, as you should have thought it through carefully when you were specifying the types of intervention you were interested in.

As an example, imagine you are working on a review of whether corticosteroids (in either oral or intravenous form) were better than non-steroidal anti-inflammatory drugs (NSAIDs) or placebo for early rheumatoid arthritis.



Activity:
Write a list of possible combinations for comparing interventions

Try writing a list of the possible combinations

A versus B
A versus C
B versus Cand so on

Now set up a list of comparisons for your review. Draw on the Table you completed in Module 5 to help you do this.

Summary statistics for individual studies

If you manage to collect useful outcome data from the studies you have included in your review, you will have some choices about how to express the outcome of each study.

These are covered in more detail in subsequent modules. For now, think about the types of data you are likely to have:

- Are they dichotomous data (such as alive/dead, smoking/not smoking)?
- Are they continuous data (such as weight in kilograms or blood pressure)?

These are the main two data types you can analyse using RevMan.

Other options in RevMan include “O-E and Variance”, “Generic Inverse Variance” and “Other data”. Individual patient data reviews involve collecting data on each individual participant in the study. This takes a lot of time and effort, but enables more detailed analysis of the relationship between study characteristics (age of the participants, for example) and the effect of the intervention than is possible using summary data for the groups of participants. The “O-E and Variance” and “Generic Inverse Variance” options allow reviewers who have conducted these types of analyses to put the results into RevMan. More information on the use of individual patient data is given in chapter 18 of the *Cochrane Handbook for Systematic Reviews of Interventions*. The option for “Other data” is used to present data in a table without doing any statistical analysis on it. This might be used for qualitative data, or quantitative data where it is inappropriate to calculate pooled averages.



Finish off the RevMan tutorial now if you haven't already done so

Choosing between different ways of presenting dichotomous and continuous outcomes is discussed in the RevMan tutorial in Part 5: Data and analyses. If you haven't yet reached that part, now would be a good time to complete the whole tutorial.

The RevMan tutorial gives a basic introduction to data analysis, which will be covered in more depth in future modules. For your protocol, you need to state how you plan to present these summary statistics for studies. Your review group may have a policy on this, so it's worth checking.

Should I combine studies?

This will be covered in more detail in a future module. For now, you need to make a few decisions about whether it is likely to be appropriate for your review to combine studies in a meta-analysis or not. You've already thought through a lot of this when defining the question – were there groups of participants, or categories of intervention that were so different you think the effect of the treatment is likely to be very different? Or do you have reason to believe the effect of treatment will vary over time? If so, it may be inappropriate to combine different studies as they are measuring a different effect.

The other key factor in deciding whether to combine studies is called statistical heterogeneity. This means variation between studies in the measured effect of treatment. This is covered in the module on heterogeneity. For now, you need to know that it is usually inappropriate to calculate an average effect (that is, perform a meta-analysis) if there is a large amount of heterogeneity. You'll find out more about how the significance of this is investigated later on. Again your review group may have a policy on wording this part of the methods section.

Subgroups and sensitivity analysis

If there were some types of participant, intervention or outcome you thought were likely to be quite different to the others, you might plan a subgroup analysis. For example, you may want to know if anti-inflammatory medication reduces pain in shoulder disorders, but not all shoulder disorders will respond the same. You may therefore decide to look at individual disorders (eg rotator cuff tendinitis, frozen shoulder, arthritis) as separate subgroups, then combine them in a pooled analysis to gain overall effect for any shoulder pain. A subgroup analysis will allow you to look at results separately and together for that analysis.



Make a list of any subgroup and sensitivity analyses you think are justified

You should specify subgroup analyses in advance. This is because choosing subgroups after you have seen the results of studies may introduce bias.

Sensitivity analyses investigate the effect of our decisions in the way we conduct a review. For example, we choose a threshold for the quality of studies, usually only including randomised controlled trials. A sensitivity analysis would allow the investigation of what would happen to the result of the review if we made this criterion even higher by only accepting randomised controlled trials with excellent allocation concealment.

As with subgroup analyses, you should specify sensitivity analyses in advance, to minimise bias.

Remember, though, that the more subgroup or sensitivity analyses you do, the more likely you are to find a statistically significant result *by chance*. So you should have good reason for each analysis you do, with, ideally, some independent evidence to support this and to predict the direction of any differences you find in these analyses. Always remember that you may be finding falsely significant results and that all findings of subgroup analyses should usually be seen as hypothesis-generating and not as proof in themselves.

Now return to Module 7 and finish designing your data extraction form, incorporating your planned analysis into the section for extracting the results of studies.