Introduction to Scientific Writing: Writing methods sections for a scientific paper

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Preamble

- The methods section of a paper is a place for you to convey the **Scientific Quality** of your work
- It will be this section that a reviewer/reader will use to accept or reject the merit of your work
- For this reason Methods needs to be written in a **Clear**, **Precise** and **Succinct** fashion
- We should think of this section as the instructions for somebody else to **replicate our study**

Conventions

Conventions:

Note:.....

Things to note given in a green box

Pitfalls:.....

Common mistakes and things to watch out for given in a red box

What we cover today (this session)

1. Introduction
2. Writing methods sections
   - Study design and sampling method
   - Measures
   - Statistical analysis
3. Gauging the quality of your own work

Tips for writing research papers (in general)

I think there are four main tips that I can give when it comes to writing any section:

1. **Signposting**: **Before you start** put in all section and subsection headings (from instructions to authors)
2. **Bullet points**: Don't worry about 'how it sounds' to start with. Don't just start writing paragraphs. Use bullet points for each point (or sentence) you want to make
3. **Purpose**: Remember the REASON for each section - if you do this then the relevant points should end up in the relavant (sub)sections
4. **Conventions**: Make sure you follow the **Instructions to Authors** and other guidelines (e.g. STROBE, CONSORT...) when you are constructing each section

and **Finally** do these FIRST, not after you have already written a bad manuscript

The importance of Planning

The difference in the quality (and importantly, NUMBER OF DRAFTS) of a paper where there has been preparation (see above) and where there has not is profound

Hint: Planning a paper

Don't just start writing. Using **OUTLINES** (Signposts and bullet points) will get you there MUCH faster and will result in a MUCH better manuscript

One more tip for writing papers (in general)

The other thing to remember in writing a paper is to get your priorities right. Remember the following three processes (In the order specified):

1. Content: WHAT you are going to say
2. Sequence: The ORDER in which you say them
3. Polish: How WELL you say them

Pitfall

One of the BIGGEST MISTAKES I think inexperienced writers make is trying to do the three things above at once. Sometimes, it may get you to the same point in the end, but it is MUCH harder work (e.g. Increases the number of drafts, takes much longer, leads to unhappy advisor and co-authors etc)

Content

- This will just be the points you want to make
- These points should be kept in dot point form
- It is much more difficult to move a whole paragraph (later in the process), because it has usually been constructed to flow onto the next paragraph....moving whole paragraphs leads to a disjointed writing style (which has to fixed up AGAIN)
- ONLY when you are happy everything is present, should you move onto the next part of the process

Sequence,or ”flow”

- Sequence is about the order in which you say things
- When sequence is right, the paper will **flow** well (logically)
- Again, you should still have things in dot point form

Polish

Only once you have got **content** and **sequence** right, should you be thinking about the **polish**. What do I mean by "polish":

- Polish is about how well we say things.
- Is our writing clear
- Is our writing precises? Does it mean what is says
- Is our writing succinct?... Every word costs a 1$ (30thb)
- Is our language (English) correct?

Hint: Polish

Well written (polished) text is much easier to **construct** from dot points, then to get from badly written paragraph text. DON'T TRY TO DO ALL THREE THINGS AT ONCE (Content, Sequence and Polish).....IT TAKES THREE TIMES AS LONG

Target Journal: Instruction to Authors and conventions

- We want to tailor our paper to our target journal. The easiest way of doing this is (before we even start writing) put in the section (and importantly, subsection) heading) the journal expects.
- Note what they expect, conventions they use etc.
- Have a look at other good papers in the journal with a similar study design to yours

Structure of a methods section

The **traditional** structure of (any) scientific research paper's methods section is split into two main sections:

1. **Materials**:
   Who are the subjects/participants (lab mice, Thai Type 2 Diabetics)
2. **Methods**:
   What was done to them (how were they measured, how were these measurements analyzed)

Structure of a methods section: Health studies

But, in health studies we can break them up into three main groups (the names of the subsections may change from paper to paper, and journal to journal):

1. Study design and sampling method
2. Measures (and, if an RCT, protocols)
3. Statistical analysis

Let's go through these subsections one-by-one

Study design and sampling method

Should include:

- **Who were the sample**. Sometimes (from the sample), it is clear who the target population are. If not, we may have to be explicit about the target population (see the worked example at end)
- A statement of the **sampling method** (e.g. Simple random sampling, proportional sampling, convienence sample...)
- If it is not clear, a statement regarding the **study design** (e.g. Cross-sectional, propective cohort etc)
- **Data source**: If relevant, where did we get the data from (e.g. Repository like DAMUS)
- **Eligibility**: Who were included in the study (inclusion criteria), and then from them, who were subsequently excluded (exclusion criteria)

Measures

This section tells the reader what measurements were taken (on the subjects). It should include:

- What was/were the outcome variable(s)
- If relevent, what was the **Study effect** (effect of interest)
- All other variables measured (Possible confounders, other independant risk factors etc.)

You should also include all details of units of measurement used, and where not standard, reasoning for this departure from convention is required

Protocol

If the study is a clinical trial, we will also need to outline the protocol:

- Randomization protocol (including the algorithm used)
- Concealment
- Blinding
- The 'treatment' and 'control' protocols

Protocol section

If the protocol section is very detailed, you may include it as a different section. Whether it appears before, or after the measurement section depends on whether the reader needs to understand the 'measurements' to understand the protocol

Statistical analysis

This section (as the name suggests) outlines how you analyzed the data. It should include the following (in this order):

1. Descriptive statistics (for both continuous and categorical variables)
2. Inferential statistics including details of both Bivariate and Multivariable analysis/modeling done. You might also mention the measures of association considered (if it is not clear from the statistical methods used)
3. Any additional detailed analysis done (e.g. subgroup analysis, sensitivity analysis-complete case vs imputed analysis)
4. A closing statement about software and significance level

Ethics statement

- Where to put your staement of ethics can be tricky
- If it is a detailed statement (i.e. involved) it can be in it's own section
- Informed consent statements can also be included here
- However, if your ethics statemnet is a single sentence, it might be worked into one of the above sections.
- Depending on the nature of the paper, it may go into the Study design and sampling method, or Measures sections
- For a clinical trial paper, I would include it in the protocol section (after all, ethics IS part of the protocol)

In several papers I have been involved in, we have actually put it at the end "statistical analysis" section. As the last section of the methods, 'small, miscellaneous" statements, such as ethics, can be put here (although some reviewers don't like it)

Gauging the strength of your methods section

Logically, assessing the quality of our methods section should be no different from critically appraising others'. However, it often doesn't work like this (especially for newbies). Hints:

- **Checklists**: These are INVALUABLE. Checklists like STROBE (observation studies) and CONSORT (RCTs) are the easiset ways of critically review your own work
- **Convention**: Compare YOUR methods to that of your literature. Is there a difference in the quality?
- **Fresh eyes 1**: Get colleagues to critique your work. Pick honest people, not nice people (reviewer aren't nice)
- **Fresh eyes 2**: Put it down for a week, and then read it again. You'll find flaws you didn't notice the first time
- **Review it early**: Review your work when it's still in BULLET POINT form. MUCH easier/ MUCH less work

Any questions??????

Thank-you!!!!!!

QUESTIONS???

Exercise

Now we will write a methods section.

- I plan to submit to a BMC journal, so I have downloaded the BMC Teχ template
- We will write a paper based on the dataset and analyses we have been doing as part of the R exercises (the DMHT data)
- We will consider the effect of Diabetes duration on Heamoglobin A1C control in Thai Type 2 diabeteics