26 Writing a report

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APPENDIX · WRITING A REPORT

How to turn an analysis into a document a reviewer, a PI, or a future version of yourself will trust.

26.1 IMRaD

Biomedical writing follows a durable convention: **Introduction, Methods, Results, and Discussion.** The structure is not an aesthetic choice — it mirrors the order in which the reader can evaluate your work. You motivate the question, describe exactly what you did, present the findings, and only then interpret them. Pre-registration and statistical analysis plans make the Methods section possible to write before the Results exist, and the five-step template taught throughout this site feeds directly into the Methods paragraph for every inferential test.

26.2 Effect sizes and intervals

Every result worth reporting is reported with both a point estimate and an interval. A p-value alone is rarely useful: it tells you whether the data are surprising under the null, but not how large the effect is or how much uncertainty you have about its magnitude. A concluding statement that will not embarrass you in five years reads like this:

> Mean arterial pressure was lower in the treatment group than in the placebo group by 6.4 mmHg (95% CI: 2.1 to 10.7; p = 0.004; Cohen's d = 0.42).

Notice the three things: the direction and magnitude of the effect, the interval, and — optionally — a standardised effect size. Nothing else is needed for the reader to think for themselves.

26.3 Figures

Two rules: **one figure, one idea**, and **no figure without a caption that could stand alone**. A caption tells the reader what the figure shows (*"Forest plot of odds ratios for each arm"*), what the units are, how many observations contribute, and — for anything inferential — what the error bars or bands represent (95% CI? SD? SE of the mean?). Use `theme_minimal()` with the site accent palette where colour is discretionary, and avoid colour-only encoding: pair colour with shape or linetype so colourblind readers can follow along.

26.4 Tables

Tables are rarely the best way to communicate a result that a plot can show, but some results genuinely need them — baseline characteristics, multi-row regression tables, multiple-imputation pooling summaries. Use `gtsummary` for all three. The point of a table is the contrast between rows, so put the thing you want the reader to compare next to itself and round numbers to sensible precision (three significant figures is usually plenty; two for proportions).

26.5 Citing R and packages

R and its packages are freely maintained by volunteers who deserve citations. At the foot of every report, include something like:

> Analysis was performed in R 4.4.1 (R Core Team 2024) using the `tidyverse` (Wickham et al. 2019), `lme4` (Bates et al. 2015), and `rstanarm` (Goodrich et al. 2024) packages.

You can get the correct citation for any package with `citation("pkgname")`. The bibliography it returns is already in BibTeX form.

26.6 Reporting guidelines

Every substantive biomedical study has a reporting guideline. Use them; reviewers will use them whether you do or not.

- **Randomised controlled trial:** CONSORT.
- **Observational study:** STROBE.
- **Diagnostic-accuracy study:** STARD.
- **Prediction-model study:** TRIPOD and TRIPOD-AI.
- **Systematic review:** PRISMA.
- **Animal research:** ARRIVE.

A checklist filled in as you write is much easier than one filled in at the end. Many journals now require a signed checklist as a supplementary file; bookmark the above now.

26.7 Reproducibility

The document you submit should come from a single render of a single source. If the numbers in the text are not the numbers in the `sessionInfo()` block at the foot of the same file, the analysis is not reproducible. Quarto, `renv`, and a version-controlled repository are together enough to get this right; the `targets` package is the next step up for anything large enough to need a dependency graph.