How to review a scientific paper:

a brief overview

Wholly based on lecture notes of:
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Anatomy of a paper

- Introduction-
- Methods-
- Results-
- Discussion-

Anatomy of a paper

- Introduction-
  - What is known/unknown?
  - Why is the question important?
  - What will the study add to the literature?

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  - Figures?
  - Sound statistical methods?

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- Results-
  - Tables?
  - Figures?
  - Sound statistical methods?
- Discussion-
  - How are the findings explained?
  - Is there biologic plausibility?
  - What is the next logical step based on the study findings?

Your role as a reviewer

Perform the *"sniff test"*
(it's the first read-through!)

- Is the manuscript :
  - believable?
  - well-written?
  - well-referenced?
  - appropriate visuals?

Your role as a reviewer
The first read-through

Perform the *"sniff test"*

- Is this manuscript believable?
  - you were chosen for your expertise in the field
  - we all have an open-mind to new ideas, but…
  - are the results just so unbelievable…?

Your role as a reviewer
The first read-through

Perform the *"sniff test"*

- Is this manuscript well-written?
  - follows instructions for authors template?
    - word count
    - section headings
  - English grammar!
  - spelling errors?
  - typographical errors?

Your role as a reviewer
The first read-through

Perform the *"sniff test"*

- References
  - up-to-date or from the last century?
  - relevant or just strength in numbers?
  - primary or secondary (reviews or textbooks) ?
  - are cross-references correct?
  - follow instructions for authors template?

Your role as a reviewer
The first read-through

Perform the *"sniff test"*

- Visual data (figures, charts, tables, photographs)
  - appropriate or unnecessary?
  - clear or confusing?
  - easy-to-read?
  - well-captioned/legend?
  - referenced?

Your role as a reviewer

Prepare for the second read-through

- Science requires an unbiased referee to ensure:

  validity

  avoid favoritism

  catch *false research* (yes, it happens!).

Your role as a reviewer
Prepare for the second read-through

- Science requires an unbiased referee
- Improve the quality of a good study
  - *(and make it a great study!)*

Your role as a reviewer
Prepare for the second read-through

- Science requires an unbiased referee to ensure validity, avoid favoritism, and catch false research (yes, it happens!)
- Improve the quality of a good study
- Help weed out "bad papers" for further serious consideration at busy journals.

Your role as a reviewer
Prepare for the second read-through

What is the question being studied?

- Is the answer really that important?
- Is hypothesis clearly stated?
- Breaking new ground or "same ol', same ol'? "

Your role as a reviewer
Prepare for the second read-through

Study Methods

- Valid and robust?
- Retrospective vs Prospective?
- Appropriate stats – sufficient power?
- Biases eliminated?
- Is data accurate – errors in collection?

Prepare for the second read-through

Conclusions

Supported by data?

Alternative explanations presented?

Discussion of strengths and weaknesses included?

Your role as a reviewer

Prepare for the second read-through

Specific: Observational studies

- Retrospective vs. Prospective?
- Design:
  - Cohort ? Case-control? Case series? Quasi-experimental design?
- Reference the STROBE statements for observational studies.
  (many high quality journals now require this!)
- Control for confounding?
  - Multivariate regression, propensity score analysis, etc..
- Conclusion
  - appropriately stated or overstated?
  - association vs. causation?

Your role as a reviewer

Prepare for the second read-through

Specific: Clinical trials

- Was the trial well designed?
- Was the *a priori* outcome stated clearly?
- Was there appropriate sample size for comparing the outcome of interest?
- If there was randomization, did it work?
- How did the study deal with:
  - dropout?
  - loss to follow-up?
  - other biases?

The second read-through
Statistics 101

- for most of us, statistics *are not* our forte
- editor can/has requested a statistical review
  - you should have a basic understanding
  - you can comment to the editor on the need for review
  - quick review on slides *at end of this presentation*

During / after the second read-through

- Take notes to prepare for your review, so that you can:
  - construct positive and negative comments
  - Organize your points clearly and logically
  - Refer: page/paragraph/line or page/figure

After the second read-through
Your review:

- follow the instructions to reviewers
  - summary statement and comments to editor
  - summary statement and comments to authors

Your review:

Comments to the editors

(~200 words)

- summary statement
- main criticisms
- recommendations

Hoppin FG: Am J Res Crit Care Med 2002;166:1019-23

Your review:

Comments to the editors

(~200 words)

- Summary statement (briefly!) restates the:
  - hypothesis
  - study design
  - findings
  - authors' conclusions

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Your review:
Comments to the editors

- Main criticisms :
  - descending order of importance
  - categorize as correctable or not

Hoppin FG: Am J Res Crit Care Med 2002;166:1019-23

Your review:
Comments to the editors

- Recommendations
  - Accept – why?
  - Accept with revisions
  - Reject (why?)

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Your review:

Comments to the authors

(~1500 word limit)

- restate summary statement
- general statement
    - impact on you
    - *mea culpa* statement (if any)
        - e.g., "…I review this research paper as a clinician…"
- major comments
- minor comments

Hoppin FG: Am J Res Crit Care Med 2002;166:1019-23

Your review:

Comments to the authors

(~1500 word limit)

- Major comments
  - statements of fact
    - clear
    - logical
    - supported
  - positive and negative comments
    - negative statements should be constructive

Hoppin FG: Am J Res Crit Care Med 2002;166:1019-23

Your review:
Comments to the authors
(~1500 word limit)

- Minor comments
  - grammar / typos / cross-reference mistakes
  - refer: page/paragraph/line or page/figure

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Your review: general thoughts

Write as you are demanding from the authors:

- English grammar
- correct spelling
- eliminate typographical errors

Be constructive

Be respectful

"…you were there once … you will be there again!"

Your review: general thoughts

Be timely in your reviews

(if you want to be asked to review in the future)

Helpful References

Hoppin FG: How I review an original scientific article. Am J Respir Crit Care Med 2002;166:1019-1023

Nicholas KA, Gordon W: A quick guide to writing a solid peer review. EOS 201; 92:233-40

The second read-through
Statistics 101

- Variables are continuous or categorical

Statistics 101

Comparing continuous variables

2 variables:

normally distributed data - T tests

skewed data - Wilcoxon Rank Sums

>2 variables:

normally distributed data - ANOVA

skewed data- Kruskal Wallis

Statistics 101

Comparing categorical variables

Chi-Square test or Fisher's exact test

Statistics 101

- Regression:
  - linear
  - logistic
  - Poisson

Statistics 101

Regression

- Linear regression:
  - modeling a continuous outcome variable

    (e.g., post op hemoglobin)

Statistics 101

Regression

- Logistic regression:
  - modeling a dichotomous outcome
  - (e.g., mortality)

Statistics 101

Regression

- Poisson regression:
  - modeling counts
  - (e.g., transfused RBC units)

Statistics 101

Regression

- Regression: linear, logistic or Poisson

- was the model reasonable?
- how did the authors select covariates?

Statistics 101

- Survival analysis - "Time to event analysis"

Statistics 101

survival analysis

Kaplan-Meier

- compares 2 or 3 groups at a point in time
- usually use the log-rank test to compare survival
- allows for "censoring"(i.e., loss to follow-up of individuals)

Statistics 101

survival analysis

Cox Proportional Hazards model

Evaluates impact of different variables

on

survival time.

Statistics 101

Presentation of Data

Confidence intervals

- critical information
  - where the estimated parameter would lie with repeated sampling
- should be 95% or even 99%
  - especially if the question is a really important one

Statistics 101

Presentation of Data

p - values

- tell you:
  - nothing about *size of the effect*
  - likelihood of getting a particular

    …or more extreme value

    (given that the null hypothesis is true)

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Based on lecture notes of:
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