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?
Anatomy of a paper

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• **Methods**
  • Observational?
  • Interventional?
  • Lab based?
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• **Results**-
  • Tables?
  • Figures?
  • Sound statistical methods?
Anatomy of a paper

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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…?
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.
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?
Your role as a reviewer
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
Comments to the editors
(~200 words)

- summary statement
- main criticisms
- recommendations

Comments to the editors
(~200 words)

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

Your review:
 Comments to the editors

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

Your review:
Comments to the editors

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

Your review:

Comments to the authors
(~1500 word limit)

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

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
**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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