Interpreting the Results and Writing a Systematic Review

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Interpreting Results

- Readers often look to the Reviewers' discussion and conclusions to make up their minds
- Many people prefer to directly go to the conclusion before looking at the rest of the review!
- Reviewers, therefore, have a responsibility to correctly interpret the results and write an unbiased discussion of the results

Cochrane Reviewers' Handbook 4.1.4, October 2001: http://www.cochrane.org/cochrane/hbook.htm

Interpreting Results

- Interpretation and discussion should focus on:
  - Strength of evidence and limitations of the original studies
  - Potential biases/limitations of the review
  - Applicability (generalizability) of results
  - Trade offs between benefits, harms and costs (if applicable)
  - Implications
    - For patient care or public health
    - For future research

Cochrane Reviewers' Handbook 4.1.4, October 2001: http://www.cochrane.org/cochrane/hbook.htm

Interpreting Results

- Strength of evidence
  - How good is the quality of included trials?
  - How large and significant are the observed effects?
  - How consistent are the effects across trials?
  - Is there a dose-response relationship?
  - Is there indirect evidence from other sources that supports the inference? (totality of evidence)
  - Have other plausible competing explanations (bias) of the observed effects been ruled out?

Cochrane Reviewers' Handbook 4.1.4, October 2001: http://www.cochrane.org/cochrane/hbook.htm

Interpreting Results

- Strength of evidence
  - Review on Chinese herbal medicine for hepatitis B:
  - "Our meta-analysis data suggest that Chinese herbal medicine in the treatment of chronic hepatitis B infection may have potential therapeutic value; however, because the studies we found were of generally poor quality, we are unable to make firm conclusions."

McCulloch M et al. Chinese herbal medicine and interferon in the treatment of chronic hepatitis B: a meta-analysis of randomized controlled trials. Am J Pub Health 2002;92:1619-28

Interpreting Results

- Potential biases/limitations of the review
  - How comprehensive was the search?
    - E.g.. potential for bias due to exclusion of non-English studies
  - Was quality assessment done?
  - Was the study selection and data extraction done reproducibly?
  - Was analysis appropriate?
  - Were heterogeneity and publication bias evaluated?

Cochrane Reviewers' Handbook 4.1.4, October 2001: http://www.cochrane.org/cochrane/hbook.htm

Interpreting Results

- Applicability (generalizability) of results
  - To whom can the review results be applied to?
  - Are there any compelling reasons why the evidence should not be applied under certain circumstances?
    - Biological issues
    - Cultural issues
    - Variation in baseline risk
    - Technology, skill, cost, etc.

Cochrane Reviewers' Handbook 4.1.4, October 2001: http://www.cochrane.org/cochrane/hbook.htm

Interpreting Results

- Trade offs between benefits, harms and costs
  - Discuss adverse effects (potential for harm)
    - E.g.. compute NNH (number needed to harm)
  - If possible, discuss cost issues
    - No need for a formal economic analysis!

With the emergence of the GRADE framework, individual SRs may not need to get into trade-offs

Cochrane Reviewers' Handbook 4.1.4, October 2001: http://www.cochrane.org/cochrane/hbook.htm

Interpreting Results

- Implications of the review:
  - For patient care or public health
    - Review found no evidence at all or weak evidence
    - Review found evidence that clearly supports intervention
    - Review found clear evidence of lack of benefit
    - Review found clear evidence of potential for harm
    - Review found evidence of important trade-offs between known benefits and known adverse effects

Cochrane Reviewers' Handbook 4.1.4, October 2001: http://www.cochrane.org/cochrane/hbook.htm

Example: Cochrane review on Alexander technique for asthma

- "**Main results**: No meta-analysis could be performed. An update search conducted in July 2001did not yield any further studies.
- **Reviewers' conclusions**: Robust, well-designed randomised controlled trials are required in order to test claims by practitioners that AT can have a positive effect on the symptoms of chronic asthma and thereby help people with asthma to reduce medication."

Dennis J, Cates C. Alexander technique for chronic asthma (Cochrane Review). In: *The Cochrane Library,* Issue 3, 2002

Example: Cochrane review on antibiotic prophylaxis for C-section

"The reduction of endometritis by two thirds to three quarters and a decrease in wound infections justifies a policy of recommending prophylactic antibiotics to women undergoing elective or non-elective C-section."

Smaill F, Hofmeyr GJ. Antibiotic prophylaxis for cesarean section (Cochrane Review). In: *The Cochrane Library,* Issue 3, 2002

Example: Cochrane mammography review

"The currently available reliable evidence does not show a survival benefit of mass screening for breast cancer (and the evidence is inconclusive for breast cancer mortality), whereas it has been shown that mass screening leads to increased use of aggressive treatment. Women, clinicians and policy makers should consider these findings carefully when they decide whether or not to attend or support screening programs."

Olsen O et al. http://image.thelancet.com/lancet/extra/fullreport.pdf

Example: Cochrane albumin review

"There is no evidence that albumin administration reduces the risk of death in critically ill patients with hypovolaemia, burns or hypoalbuminaemia, and a strong suggestion that it may increase the risk of death. These data suggest that the use of human albumin in critically ill patients should be urgently reviewed and that it should not be used outside the context of a rigorously conducted randomised controlled trial."

The Albumin Reviewers (Alderson P, Bunn F, Lefebvre C, Li Wan Po A, Li L, Roberts I, Schierhout G). Human albumin solution for resuscitation and volume expansion in critically ill patients (Cochrane Review). In: *The Cochrane Library,* Issue 3, 2002

Should SRs make policy recommendations?

- Emerging consensus:
  - SRs are not sufficient
  - SRs should be considered by guideline development groups and experts
    - Several SRs may need to be considered
    - Harms, values and costs need to be taken into account
    - Feasibility, patient preferences, etc, are important
  - So, guidelines and policy recommendations emerge from a larger process, not SRs

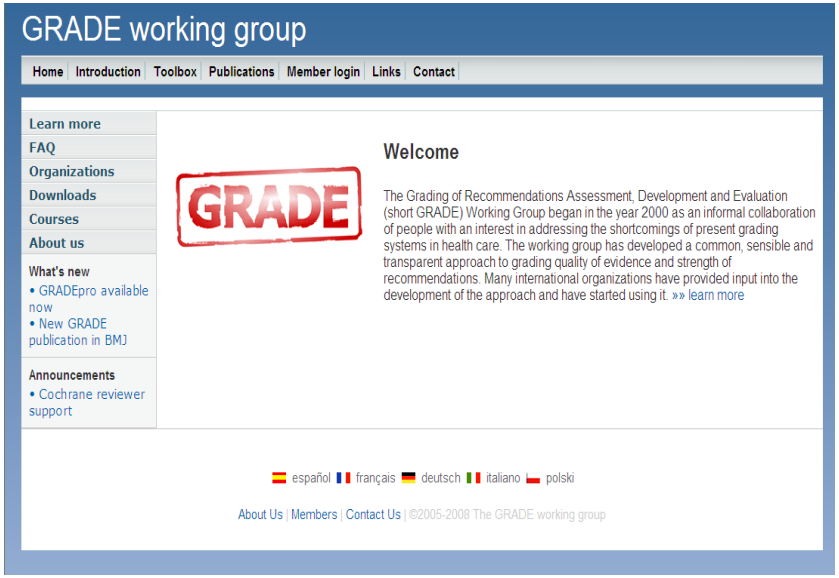
Guidelines and recommendations: GRADE

ANALYSIS

RATING QUALITY OF EVIDENCE AND STRENGTH OF RECOMMENDATIONS

GRADE: an emerging consensus on rating quality of evidence and strength of recommendations

Guidelines are inconsistent in how they rate the quality of evidence and the strength of recommendations. This article explores the advantages of the GRADE system, which is increasingly being adopted by organisations worldwide



Systematic reviews should not include health care recommendations

Guidelines and recommendations: GRADE

What do we mean by the strength of a recommendation?

The strength of a recommendation reflects the extent to which we can be confident that the desirable effects of an intervention outweigh the undesirable effects. Desirable effects of an intervention include reduction in morbidity and mortality, improvement in quality of life, reduction in the burden of treatment (such as having to take drugs or the inconvenience of blood tests), and reduced resource expenditures. Undesirable consequences include adverse effects that have a deleterious impact on morbidity, mortality, or quality of life or increase use of resources.

Quality of evidence

High quality	⊕⊕⊕⊕ or A
Moderate quality	⊕⊕⊕◯ or B
Low quality	⊕⊕◯◯ or C
Very low quality	⊕◯◯◯ or D

Strength of recommendation

Strong recommendation for using an intervention	↑ ↑ or 1
Weak recommendation for using an intervention	↑ ? or 2
Weak recommendation against using an intervention	↓ ? or 2
Strong recommendation against using an intervention	↓ ↓ or 1

Fig 2 Representations of quality of evidence and strength of recommendations

Determinants of strength of recommendation

Factor	Comment
Balance between desirable and undesirable effects	The larger the difference between the desirable and undesirable effects, the higher the likelihood that a strong recommendation is warranted. The narrower the gradient, the higher the likelihood that a weak recommendation is warranted
Quality of evidence	The higher the quality of evidence, the higher the likelihood that a strong recommendation is warranted
Values and preferences	The more values and preferences vary, or the greater the uncertainty in values and preferences, the higher the likelihood that a weak recommendation is warranted
Costs (resource allocation)	The higher the costs of an intervention—that is, the greater the resources consumed—the lower the likelihood that a strong recommendation is warranted

http://www.gradeworkinggroup.org/

Interpreting Results

- Implications of the review:
  - For future research
    - Avoid platitudes like “more research is needed”
    - State clearly if further research is necessary
    - If necessary, state what type of research should be done and why
      - Give clear directions about what specific study design or quality issues should be addressed in future studies

Cochrane Reviewers’ Handbook 4.1.4, October 2001: http://www.cochrane.org/cochrane/hbook.htm

Writing the review

- Guidelines on how to write reviews & meta-analyses:
  - PRIMSA statement*
    - For meta-analysis of RCTs
  - MOOSE guidelines**
    - For meta-analysis of observational studies
  - IOM. Standards for Systematic Reviews

*Moher et al. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(6): e1000097.

**Stroup et al. *JAMA 2000;*283:2008-2012.

Both available at URL: http://www.consort-statement.org/

http://www.prisma-statement.org/

OPEN ACCESS Freely available online

PLoS MEDICINE

Guidelines and Guidance

Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement

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Introduction

Systematic reviews and meta-analyses have become increasingly important in health care. Clinicians read them to keep up to date with their field [1,2], and they are often used as a starting point for developing clinical practice guidelines. Granting agencies may require a systematic review to ensure there is justification for further research [3], and some health care journals are moving in this direction [4]. As with all research, the value of a systematic review depends on what was done, what was found, and the clarity of reporting. As with other publications, the reporting quality of systematic reviews varies, limiting readers' ability to assess the strengths and weaknesses of those reviews.

Several early studies evaluated the quality of review reports. In 1987, Mulrow examined 50 review articles published in four leading medical journals in 1985 and 1986 and found that none met all eight explicit scientific criteria, such as a quality assessment of included studies [5]. In 1987, Sacks and colleagues [6] evaluated the adequacy of reporting of 83 meta-analyses on 23 characteristics in six domains. Reporting was generally poor; between one and 14 characteristics were adequately reported (mean = 7.7; standard deviation = 2.7). A 1996 update of this study found little improvement [7].

In 1996, to address the suboptimal reporting of meta-analyses, an international group developed a guidance called the

clinicians, medical editors, and a consumer. The objective of the Ottawa meeting was to revise and expand the QUOROM checklist and flow diagram, as needed.

The executive committee completed the following tasks, prior to the meeting: a systematic review of studies examining the quality of reporting of systematic reviews, and a comprehensive literature search to identify methodological and other articles that might inform the meeting, especially in relation to modifying checklist items. An international survey of review authors, consumers, and groups commissioning or using systematic reviews and meta-analyses was completed, including the International Network of Agencies for Health Technology Assessment (INAHTA) and the Guidelines International Network (GIN). The survey aimed to ascertain views of QUOROM, including the merits of the existing checklist items. The results of these activities were presented during the meeting and are summarized on the PRISMA Web site (http://www.prisma-statement.org/).

Only items deemed essential were retained or added to the checklist. Some additional items are nevertheless desirable, and review authors should include these, if relevant [10]. For example, it is useful to indicate whether the systematic review is an update [11] of a previous review, and to describe any changes in procedures from those described in the original protocol.

http://www.prisma-statement.org/

Table 1. Checklist of items to include when reporting a systematic review or meta-analysis.

Section/Topic	#	Checklist Item	Reported on Page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome-level assessment (see Item 12).	
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group and (b) effect estimates and confidence intervals, ideally with a forest plot.	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	
DISCUSSION			

http://www.prisma-statement.org/

Meta-analysis of Observational Studies in Epidemiology

A Proposal for Reporting

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for the Meta-analysis Of Observational Studies in Epidemiology (MOOSE) Group

Objective Because of the pressure for timely, informed decisions in public health and clinical practice and the explosion of information in the scientific literature, research results must be synthesized. Meta-analyses are increasingly used to address this problem, and they often evaluate observational studies. A workshop was held in Atlanta, Ga, in April 1997, to examine the reporting of meta-analyses of observational studies and to make recommendations to aid authors, reviewers, editors, and readers.

Participants Twenty-seven participants were selected by a steering committee, based on expertise in clinical practice, trials, statistics, epidemiology, social sciences, and biomedical editing. Deliberations of the workshop were open to other interested scientists. Funding for this activity was provided by the Centers for Disease Control and Prevention.

Evidence We conducted a systematic review of the published literature on the conduct and reporting of meta-analyses in observational studies using MEDLINE, Educational Research Information Center (ERIC), PsycLIT, and the Current Index to Statistics. We also examined reference lists of the 32 studies retrieved and contacted experts in the field. Participants were assigned to small-group discussions on the subjects of bias, searching and abstracting, heterogeneity, study categorization, and statistical methods.

Consensus Process From the material presented at the workshop, the authors developed a checklist summarizing recommendations for reporting meta-analyses of observational studies. The checklist and supporting evidence were circulated to all conference attendees and additional experts. All suggestions for revisions were addressed.

Conclusions The proposed checklist contains specifications for reporting of meta-analyses of observational studies in epidemiology, including background, search strategy, methods, results, discussion, and conclusion. Use of the checklist should improve the usefulness of meta-analyses for authors, reviewers, editors, readers, and decision makers. An evaluation plan is suggested and research areas are explored.

JAMA. 2000;283:2008-2012 www.jama.com

BECAUSE OF PRESSURE FOR TIMELY and informed decisions in public health and medicine and the explosion of information in the scientific literature, research results must be synthesized to answer urgent questions.[1-4] Principles of evidence-based methods to assess the effectiveness of

Table. A Proposed Reporting Checklist for Authors, Editors, and Reviewers of Meta-analyses of Observational Studies

- Reporting of background should include
  - Problem definition
  - Hypothesis statement
  - Description of study outcome(s)
  - Type of exposure or intervention used
  - Type of study designs used
  - Study population
- Reporting of search strategy should include
  - Qualifications of searchers (eg, librarians and investigators)
  - Search strategy, including time period included in the synthesis and keywords
  - Effort to include all available studies, including contact with authors
  - Databases and registries searched
  - Search software used, name and version, including special features used (eg, explosion)
  - Use of hand searching (eg, reference lists of obtained articles)
  - List of citations located and those excluded, including justification
  - Method of addressing articles published in languages other than English
  - Method of handling abstracts and unpublished studies
  - Description of any contact with authors
- Reporting of methods should include
  - Description of relevance or appropriateness of studies assembled for assessing the hypothesis to be tested
  - Rationale for the selection and coding of data (eg, sound clinical principles or convenience)
  - Documentation of how data were classified and coded (eg, multiple raters, blinding, and interrater reliability)
  - Assessment of confounding (eg, comparability of cases and controls in studies where appropriate)
  - Assessment of study quality, including blinding of quality assessors; stratification or regression on possible predictors of study results
  - Assessment of heterogeneity
  - Description of statistical methods (eg, complete description of fixed or random effects models, justification of whether the chosen models account for predictors of study results, dose-response models, or cumulative meta-analysis) in sufficient detail to be replicated
  - Provision of appropriate tables and graphics
- Reporting of results should include
  - Graphic summarizing individual study estimates and overall estimate
  - Table giving descriptive information for each study included
  - Results of sensitivity testing (eg, subgroup analysis)
  - Indication of statistical uncertainty of findings
- Reporting of discussion should include
  - Quantitative assessment of bias (eg, publication bias)
  - Justification for exclusion (eg, exclusion of non–English-language citations)
  - Assessment of quality of included studies
- Reporting of conclusions should include
  - Consideration of alternative explanations for observed results
  - Generalization of the conclusions (ie, appropriate for the data presented and within the domain of the literature review)
  - Guidelines for future research
  - Disclosure of funding source

Standards for Reporting Systematic Reviews

STANDARD 5.1
Prepare final report using a structured format

5.1.1 Include a report title

5.1.2 Include an abstract

5.1.3 Include an executive summary

5.1.4 Include a summary written for the lay public

5.1.5 Include an introduction (rationale and objectives)

5.1.6 Include a methods section. Describe the following:

- Research protocol
- Eligibility criteria (criteria for including and excluding studies in the systematic review)
- Analytic framework and key questions
- Databases and other information sources used to identify relevant studies
- Search strategy
- Study selection process
- Data extraction process
- Methods for handling missing information
- Information to be extracted from included studies
- Methods to appraise the quality of individual studies
- Summary measures of effect size (e.g., risk ratio, difference in means)
- Rationale for pooling (or not pooling) results of included studies
- Methods of synthesizing the evidence (qualitative and meta-analysis)
- Additional analyses, if done, indicating which were prespecified

5.1.7 Include a results section. Organize the presentation of results around key questions. Describe the following (repeat for each key question):

- Study selection process
- List of excluded studies and reasons for their exclusion
- Appraisal of individual studies' quality
- Qualitative synthesis
- Meta-analysis of results, if performed (explain rationale for doing one)
- Additional analyses, if done, indicating which were prespecified
- Tables and figures

5.1.8 Include a discussion section. Include the following:

- Summary of the evidence
- Strengths and limitations of the systematic review
- Conclusions for each key questions
- Gaps in evidence
- Future research needs

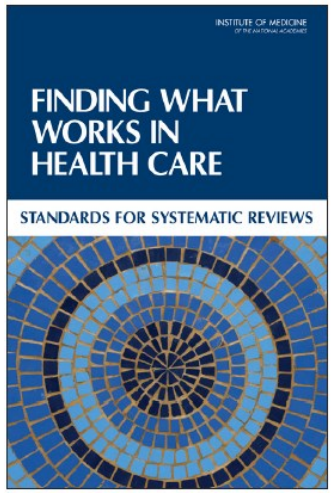
5.1.9 Include a section describing funding sources and COI

STANDARD 5.2
Peer review the draft report

5.2.1 Use a third party to manage the peer review process

5.2.2 Provide a public comment period for the report and publicly report on disposition of comments

STANDARD 5.3
Publish the final report in a manner that ensures free public access



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PLoS Medicine Guidelines for Authors

Detailed below are guidelines for authors about the journal, open access, the editorial process, and production process. We also provide checklists for submitting manuscripts for the first time, submitting revised manuscripts, and detailed figure guidelines.

Contents:

b. Systematic Reviews and Meta-Analyses

Reports of systematic reviews and meta-analyses should use the PRISMA statement as a guide, and include a completed PRISMA checklist and flow diagram to accompany the main text. Blank templates of the checklist and flow diagram can be downloaded from the PRISMA Web site.

Some tips for getting your SR published!

- A review worth doing is worth doing well; a review that is done well is worth publishing!
  - You have put in all the hard work – others need to benefit from it!
- There is a golden time window after review completion – try and get your paper out quickly at this point… longer you wait, harder it gets (review gets out of date)
  - Let the paper incubate on the editor's desk than your own!
- Use the PRISMA checklist headings and flow chart and mention using it
  - If you used all the PRIMSA subheadings, your manuscript will look terrific!
- Do not hesitate to brag about the strengths of your review
- Make sure you include a section on limitations of the review and of the original studies

Keeping your SR updated

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Policy Forum

Living Systematic Reviews: An Emerging Opportunity to Narrow the Evidence-Practice Gap

Julian H. Elliott[1,2*], Tari Turner[2,3], Ornella Clavisi[4], James Thomas[5], Julian P. T. Higgins[6,7], Chris Mavergames[8], Russell L. Gruen[4,9]

The art and science of publishing

Writing is 90% procrastination and 30% panic.

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Centre international de TB McGill

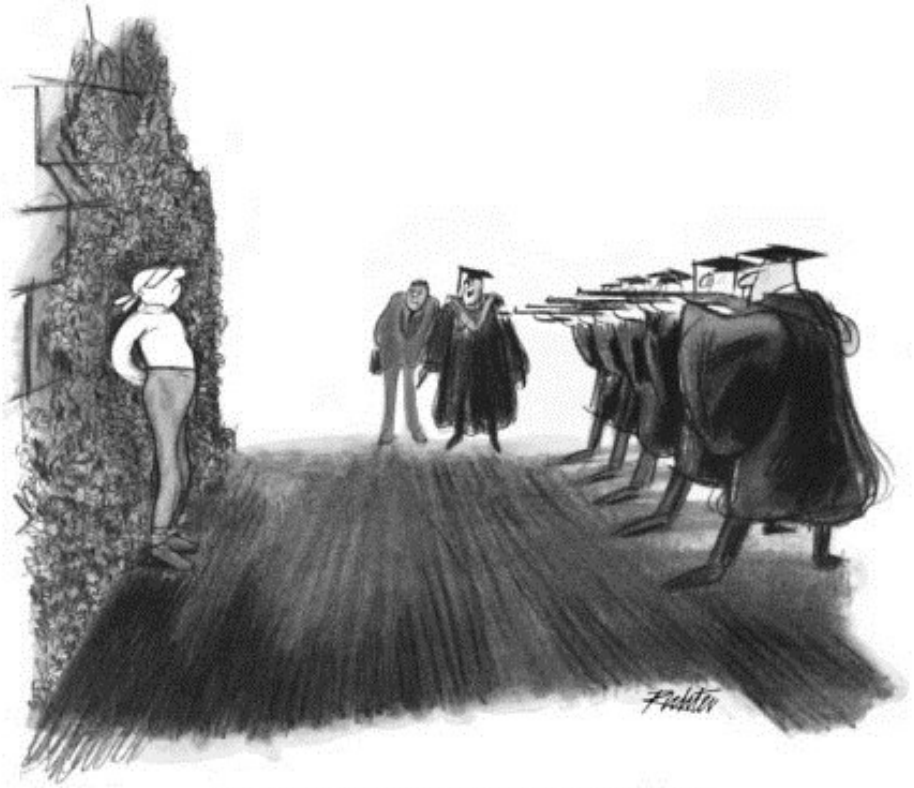
McGill International TB Centre

McGill

What makes me qualified to talk about this topic?

- I have authored 200+ papers and have had many rejections
- I have peer reviewed papers for 50+ journals
- I am an editorial board member of:
  - Lancet Infect Dis
  - PLoS Medicine
  - PLoS One
  - International J of TB and Lung Disease
  - Journal of Epidemiology & Global Health
  - Expert Review of Molecular Diagnostics
  - Indian Journal of Tuberculosis
  - Indian Journal of Medical Microbiology

In academia, publications are critical for success (tenure, grants, etc.)



"It's publish or perish, and he hasn't published."

To get postdoctoral or advanced training positions, publications are quite critical

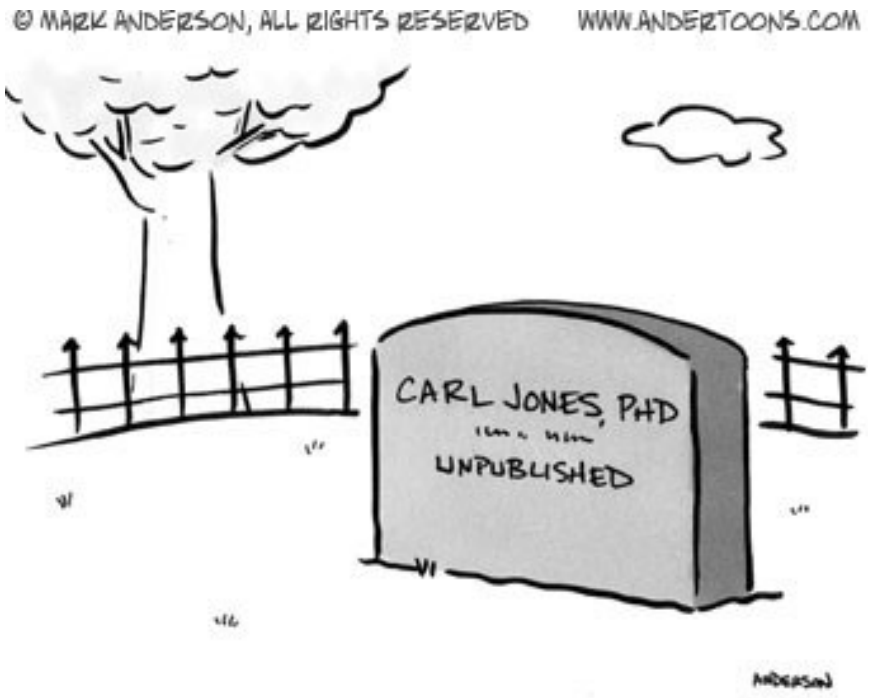
Ten things to keep in mind when applying for postdoc or other training opportunities

Professors at research intensive universities often receive hundreds of emails regarding potential training opportunities. Which request is likely to receive more attention? Which request is likely to be deleted without a response? Here is a list of top 10 things to keep in mind when applying for postdoc or other training opportunities. They are relevant even for job applications.

1. Do not send generic (copy/paste) emails to lots of people at the same time – few people bother to read such mass emails! Such emails convey the impression that you are lazy and cannot write to professors individually.
2. Do not write letters/emails without specifically addressing the professor by name. It is impolite to write for the first time without writing the full name of the professor. In particular, do not write a letter that begins with "Dear Sir or Madam" – this suggests that you haven't bothered to find out anything about the professor.
3. Always investigate the background and research interests of the professor you are planning to contact (most professors will have their own websites or biosketches with this information). Make it clear in your letter that you are aware of the research focus of the professor. If you are responding to an advertisement, then make sure you meet the eligibility criteria. This issue of "fit" is absolutely critical. Nobody wants to spend time, effort and funding on students that do not work on their area of research focus! On the other hand, you have a very good chance of succeeding if you select a researcher whose interests perfectly match with your own!
4. In general, it is not advisable to contact professors who don't share your research interests or have a completely different training background. For example, if your research interest is in malaria, there is not much to be gained by writing to a professor whose research program is focused on cancer! If you are interested in laboratory or basic science research, do not write to researchers who do not do laboratory research. In the same vein, if your PhD was in zoology, there is no point in contacting an epidemiologist. If you do decide to write to a researcher whose research focus is very different from yours, then explain your reason for contacting them. Perhaps you want to learn a technique or skill that has broader application? Explaining this early in your letter might help.
5. Publications (even co-authored) in your area of research are very important. If you have no publications, then you have a low likelihood of being accepted into any postdoc fellowship program. Lack of publications suggests little or no prior research experience. If you have publications, attaching them (or at least a few major publications) will make a big impact.
6. Always send your latest CV along with your cover letter. Your CV should be well written, with no typographic errors. It should list your educational degrees, your research work, your publications, awards, etc. Your CV should list the names and contact information of at least 3 referees who know about your work.
7. It often helps if someone else makes the initial contact on your behalf. For example, if your mentor or supervisor writes a letter introducing you, this might get more attention, especially if the professor being contacted knows your mentor or his/her research work.
8. It is also very helpful if you have funding or fellowships of your own that you can bring with you. If this is the case, clearly explain what the funding source is and how much of your training it might cover.
9. Carefully proof read your email before sending it. Typographic errors and sloppy writing can easily put off people!
10. Lastly, if you don't get a response, try again after a while. Persistence often works!

Peer-reviewed publications is the best method of disseminating knowledge: if we don't publish, nobody has access to the data

Publishing is the natural culmination of your hard work.
Do not contribute to the already bad problem of publication bias!!

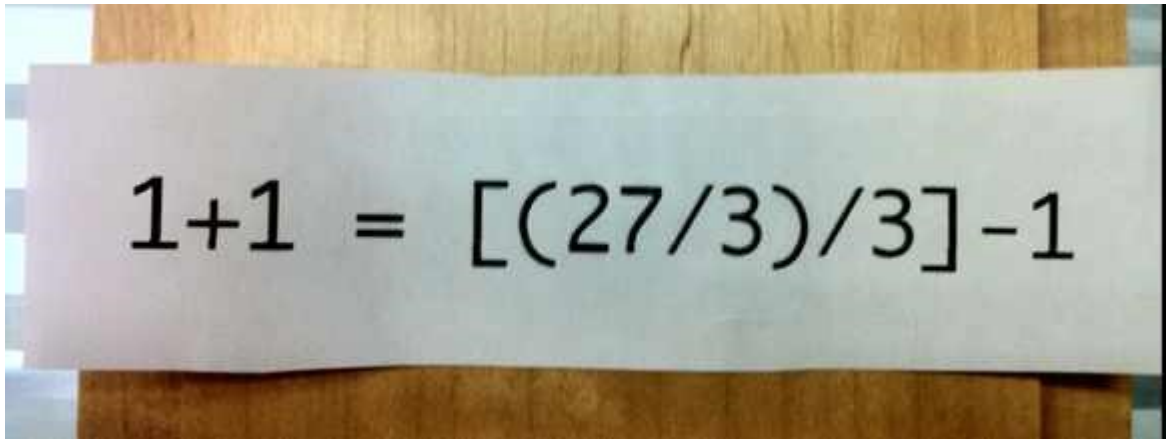


Be a finisher!

Here are some

Target the right journal

What is the narrative?
Tell a clear, simple story
[identify your message early]

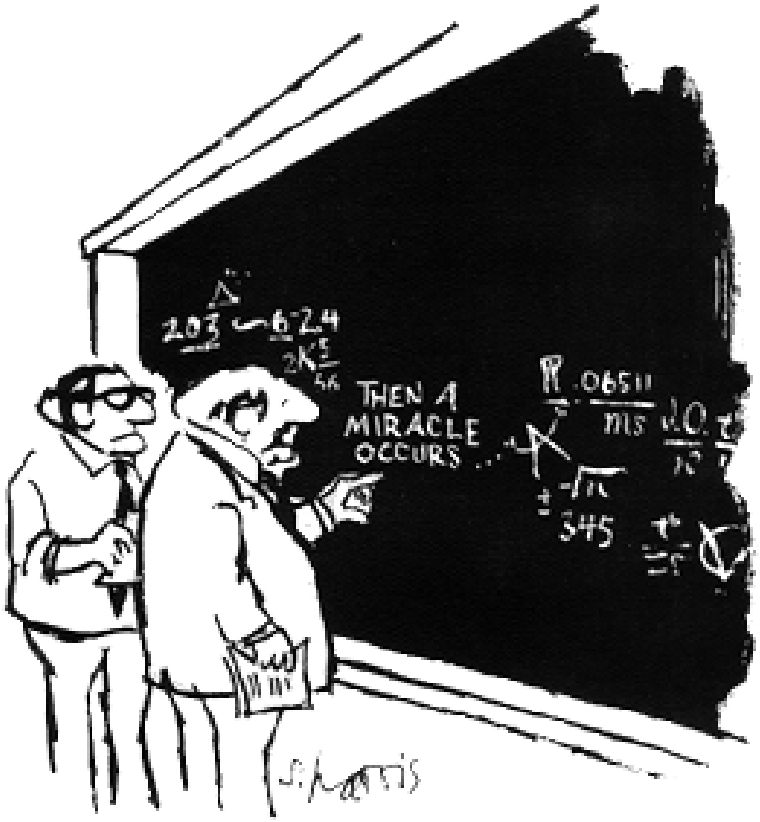


Follow a clear structure

[why you started, what you did, what you found, and what it means]

Follow existing standards/templates (STARD, CONSORT, PRISMA, STROBE, etc.) – use subheads liberally

You know a lot about your research; do not assume the editors and reviewers do!



"I think you should be more explicit here in step two."

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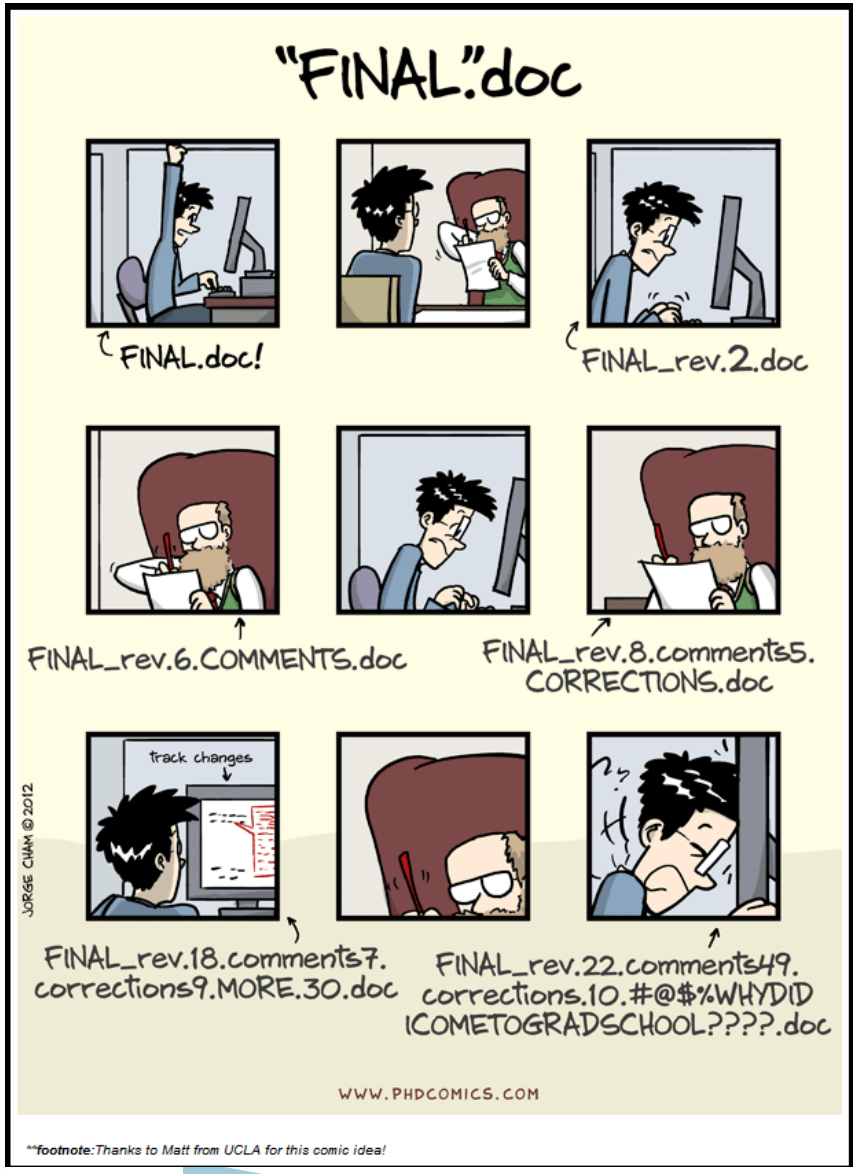
Have others read your manuscript before submission

- A good guide will give critical but constructive feedback
- You could present your paper to a group and get great feedback

- Make sure your final manuscript is polished and presentable (no typos, no bad formatting, etc.)

Go through multiple drafts before submitting



Be very careful about copying and pasting from online sources (plagiarism)

Dear Dr. Pai,

You should be receiving an email notifying you that an **iThenticate account** has been created for you. Please follow the instructions provided in the email to register.

iThenticate is a software tool being used by Elsevier in order to assist against plagiarism. Once you upload a document, the system will scan and provide you with a number percentage – this number represents how much of the paper is plagiarized.

You can find the Quick Start Guide at :
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https://edgecastcdn.net/800404/app.ithenticate.com/static/build/media/5803c64c4145d6bf041d4c0879aa9f3dcb_iThenticate_Manual.pdf

Finally, please do not rely solely on the "plagiarism percentage." In some cases, an author may have only plagiarized a very small – but extremely relevant – portion of the document, such as the data or results. And there is no one percentage that indicates a problem; each and every manuscript should be investigated carefully against the results.

In all cases, please feel free to contact us if you have a question about the results you receive. We have the ability to proxy into your account and see your results so that we can advise you. Finally, if you do encounter an ethical problem please do contact us so that we can assist you with the investigation and afford you Elsevier's legal protection.

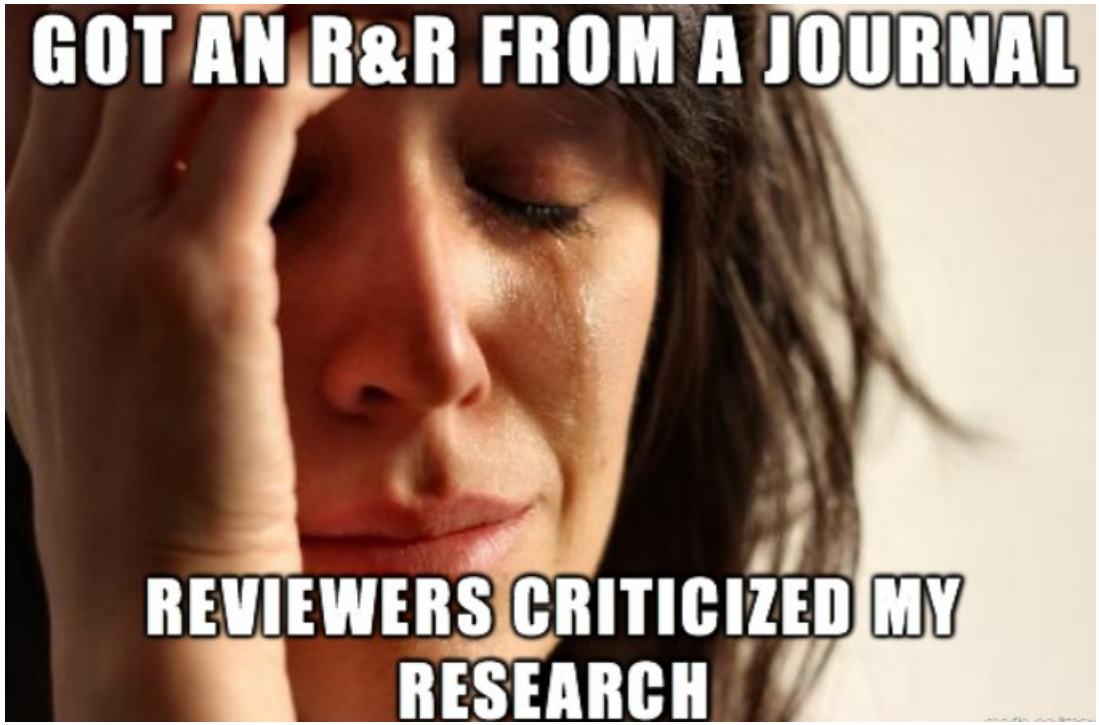
If you borrow text, then put them in quotes and cite the original so
If you borrow figures/tables, seek permission from copyright hold

Tone is important!

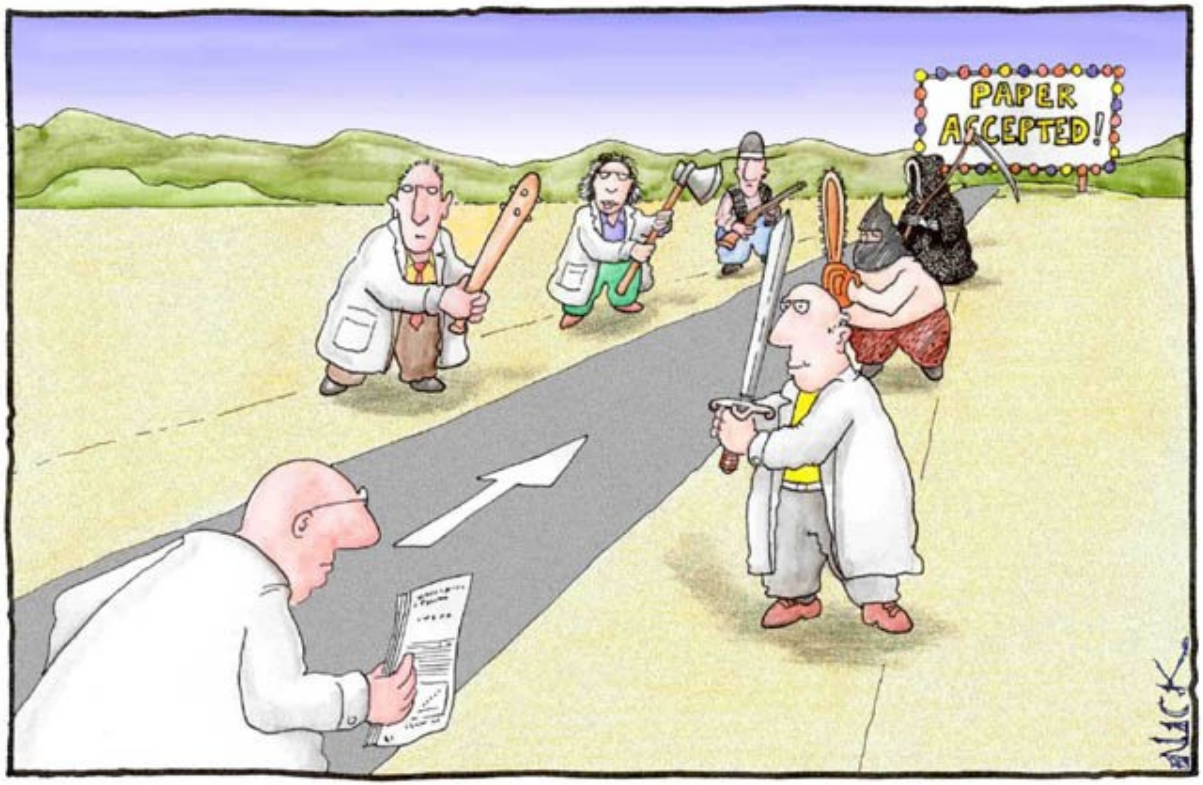
- Do not overstate the importance of the findings
- Clearly discuss study limitations

Revise and resubmit is the most desirable first decision!

- Do not expect the paper to get accepted right away
- R&R is the whole point of peer review
- All papers can be improved!



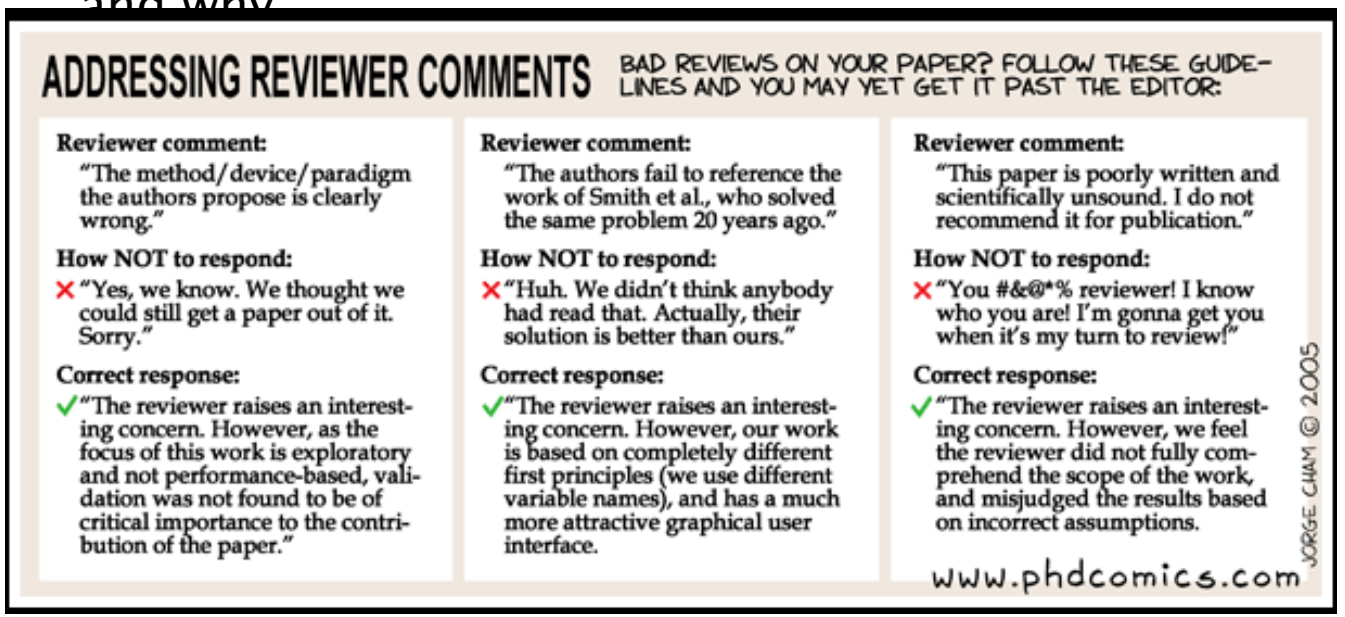
Peer reviews can greatly improve your paper – Take reviews seriously and learn from them



Most scientists regarded the new streamlined peer-review process as 'quite an improvement.'

Take revisions seriously and address all comments

- If asked to revise, address every comment and do it *politely*
  - Make it easy for the editor to see that you have addressed all comments
  - You don't have to make all changes, but explain what you did and why



If rejected (which will happen a lot!), use the reviews to improve the paper and quickly re-submit – perseverance is critical for success

I began my journey over 15 years ago…

Sanitation for rural communities: first win the people's support

Samson Rao, Madhukar Pai, A. Iyanar, & Abraham Joseph

Bull WHO 1997

IJMR 1997

An epidemic of diarrhoea in south India caused by enteroaggregative *Escherichia coli*

Madhukar Pai, Gagandeep Kang*, B.S. Ramakrishna*, Aparna Venkataraman* & Jayaprakash Muliyil

Malaria and Migrant Labourers

Socio-Epidemiological Inquiry

Madhukar Pai
Anand Zachariah
Winsley Rose
Samuel Satyajit
Santosh Verghese
Abraham Joseph

Econ Pol Weekly 1997

And have persisted, and gotten better (hopefully!)

***Mycobacterium tuberculosis* Infection in Health Care Workers in Rural India**
Comparison of a Whole-Blood Interferon γ Assay With Tuberculin Skin Testing

Tuberculosis 4

Biomarkers and diagnostics for tuberculosis: progress, needs, and translation into practice

Robert S Wallis*, Madhukar Pai*, Dick Menzies, T Mark Doherty, Gerhard Walzl, Mark D Perkins†, Alimuddin Zumla†

Annals of Internal Medicine

REVIEW

Systematic Review: T-Cell–based Assays for the Diagnosis of Latent Tuberculosis Infection: An Update

Madhukar Pai, MD, PhD; Alice Zwerling, MSc; and Dick Menzies, MD, MSc

OPEN ACCESS Freely available online

PLOS MEDICINE

Serological Testing Versus Other Strategies for Diagnosis of Active Tuberculosis in India: A Cost-Effectiveness Analysis

David W. Dowdy[1], Karen R. Steingart[2], Madhukar Pai[3]*

Tuberculosis Diagnosis — Time for a Game Change

Peter M. Small, M.D., and Madhukar Pai, M.D., Ph.D.

As with everything else, you get better at writing/publishing with time!

You have to start somewhere…