A Writer's Algorithm
or
Papers Without (too much) Pain

UZ-UCSF Collaborative Research Programme

Writing Workshop

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Today's agenda

- A framework for:
  - Presenting research
  - Teaching writing skills
- The Writer's Algorithm
  - The basics of good writing habits
  - The sections of a paper
  - The basics of effective self-editing
- Managing Reviews

Today's style

- Please interrupt frequently
- Share with others - research and writing are not solitary pursuits - at least not mostly

Most research involves a simple finding

A > B

Weight of experimental mice > Weight of control mice

Bone density with *TT* genotype > Bone density with *tt* genotype

Survival after surgery > Survival with medical therapy

Health care in UK > Health care in US

Who cares?

- Who is your audience?
- Which journals are “reach” schools?
- Where have you published before?

Choosing a journal

- Strategy 1
  - Ask senior colleagues for likely, possible, and reach suggestions
  - Send to one of the "possibles"
  - Send to a "likely" if in a hurry (a grant deadline is upcoming; a performance review is scheduled)

- Strategy 2
  - Find the most equivalent recently published article
  - Use JANE (Journal/Author Name Estimator http://www.biosemantics.org/jane/

What happens at a journal?

- Log-in; administrative review
- Editorial review
  - Yea or nay from 1-2 “screening” editors
  - Directly to associate editor in that area
- Unanimous “nays” = rejection

The only REAL Rule

KNOW YOUR DATA!

Manuscript Title

- Based on the research question (P-I-C-O!)
- Interesting (catchy), *dynamic and conclusive, rather than descriptive*

  "Hypoxia Inhibits Kv1.5 Channels in Rat Pulmonary Artery Smooth Muscle Cells" is preferable to

  "Effects of Hypoxia on Kv1.5 Channels.
- Remember the *magic* words
  - Randomized, blinded, prospective, etc.

Getting Started on the Title

- State the research question
  - Is A associated with B in population C?
  - Is tai chi associated with falls in older women?
- Include important methodology e.g., RCT
- Draft a title
  - Effect of tai chi on risk of falls in older women: a randomised controlled trial
- Use clear, precise descriptions

Improving a Boring Title

- State the main findings of your study
  - Older women randomized to tai chi had a lower risk of falls and better quality of life than those randomized to a wait list
- Add interesting design features to the title
  - Practicing tai chi reduces risk of falls in sedentary older women. A randomized trial

Polishing a Good Title

- Make it interesting
  - Tai chi prevents falls and improves quality of life in sedentary elderly women. A randomised trial
- Don’t go overboard
  - Kick-butt older women don’t fall: A randomized trial

Title Checklist

- Are the title and the RQ closely related?
- Is the title objective in tone?
- Are special features of the study mentioned? (cross-over, prospective, randomized, special populations)

Good Title!

- Tai chi prevents falls and improves quality of life in sedentary elderly women: A randomised trial

The 4 basic parts of an abstract, paper, or presentation

- *Introduction*: **Why** would it matter if you could show that A > B?
- *Methods*: **How** you will show that A > B.
  - (Effect size: Comparing A with B)
- *Results*: **Show** that A > B.
- *Discussion*: **What is the implication**, now that we know that A >B?

Begin Before the Beginning

- Scribble or type a list of topics, themes, ideas, conclusions, in any order
- Work for about 15 minutes and then **reward yourself** with a cup of tea, and a quick peek at Big Brother Africa or Grey's Anatomy?

Create a Scaffold

- Using the **Instructions for Authors** contained on the Web site of every journal, set up the major headings/sections of the paper
- You are now not looking at a blank screen and can treat yourself to a **snack and a cup of tea – or be bold and have a rooibos latte!**

Put on the Sorting Hat

- Insert fragments from the scribbled list into the scaffolding sections, eg, background? result? discussion?
- Pen a meaningful topic sentence for the fragments. ***Note:*** *meaningful = an original idea that sets up the issue to be discussed in that section or paragraph*
- Continue to fill in the space under the topic sentences by moving entries around, and by adding entries from the scribbled list
- Open Endnote or other reference library and troll around

Put on the Sorting Hat (continued)

- Note ideas for tables, boxes, figures
- Re-check rules for authors as to formatting requirements
- Note areas that require further thought or discussion
- Go for a run or a bike ride

Write an Introduction

- Do not reinvent the wheel - go back to the grant, proposal, RFP
- **Content:** The introduction is your promise to the reader
- Use a writing resource, style manual, dictionary, grammar guide

American Medical Association Style Manual www.amamanualofstyle.com/

Merriam Webster online dictionary http://www.merriam-webster.com/

Stedman's Medical Spellchecker and dictionaries www.stedmans.com/

Nuts and Bolts of Scientific Writing- Constance Baldwin, PhD http://www.academicpeds.org/espauthoring/page_01.htm

Content of Introduction

- The introduction is your promise to the reader (in 3-4 paragraphs or less - PRESENT TENSE FOR ESTABLISHED KNOWLEDGE)
- Describe:
  - **Background** (why the problem was compelling)
  - State of the field (relevant literature to date)
  - **Gap in the knowledge** your study question bridges
  - The reason your findings will be **relevant**, and (if you're feeling brave) the **contribution** you have made
- Close with a "**road map**" of what the reviewer/ reader will find in the paper:
  - Hypothesis, Design, Sample, Methods

3-4 Elegant Paragraphs

- Importance of the condition/question
  - Scientific, clinical, public health impact
- Previous research in the area
  - BRIEF summary
- Problems with previous research – the existing "gap"
- How your study addresses problems
  - BRIEF overview of the study

The Issue - Set Up in the Intro

#1Breastfeeding protects against gastroenteritis, lower respiratory infection, and other infectious diseases in infancy.

#2 Longer duration of exclusive breastfeeding is associated with greater benefit. Low breastfeeding confidence in the first week of life predicts early breastfeeding discontinuation, and existing evidence is weak because…

#3 Research QUESTION – Is poor infant weight gain associated with reduced breastfeeding confidence?

Introduction: The Final Test

- After reading it, could someone *not* familiar with the field understand…
  - **Why** you did the study
  - **How** it advances the current state of the evidence

Improve the Introduction

- Focus on the big picture – don't provide too much detail
- Don't state the obvious – "death is bad"
- Summarize prior research – don't describe studies one-by-one
- Emphasize the problems with prior research that your study addresses
- Be objective – avoid hostility and overstatement
- Avoid jargon and acronyms

Shorten the Introduction

- Do you have more than 4 paragraphs?
- Is some of the material tangential or extraneous?
- Did you describe prior research in too much detail?
- Is the description of your study more than 2 sentences?

PLOS Medicine Editor's Summary

Editors' Summary

Background

About 35 million people are currently infected with HIV, the virus that causes AIDS by destroying immune system cells and leaving infected individuals susceptible to other infections. Early in the AIDS epidemic, most HIV-infected individuals died within ten years of infection. Then, in 1996, effective antiretroviral (ARV) therapy—drug combinations that suppress HIV replication by inhibiting reverse transcriptase and other essential viral enzymes—became available. For people living in affluent countries, HIV/AIDS became a chronic condition, but because ARV therapy was expensive, HIV/AIDS remained fatal in low- and middle-income countries (LMICs). In 2003, the international community began to work towards achieving universal access to ARV therapy. Now, more than 10 million HIV-positive individuals in LMICs receive ARV therapy, usually as a fixed-dose combination of two nucleoside reverse transcriptase inhibitors (NRTIs), such as tenofovir and lamivudine, plus a non-nucleoside reverse transcriptase inhibitor (NNRTI), such as efavirenz or nevirapine.

Why Was This Study Done?

The global scale-up of ARV therapy has reduced deaths from HIV/AIDS and the incidence of HIV infection in LMICs, but the development of resistance to ARV therapy is threatening these advances. HIV rapidly accumulates genetic changes (mutations), some of which make HIV resistant to ARV therapy. Up to 30% of patients receiving a fixed-dose NRTI/NNRTI combination develop virological failure, and a high proportion of these patients develop mutations associated with resistance to the ARVs in their regimen. Moreover, the proportion of newly infected, ARV-naïve individuals with transmitted drug resistance (TDR) is also increasing. Organizations involved in HIV/AIDS control need to understand the regional and temporal mutational patterns of TDR to inform the development of guidelines for first-line ARV therapy and of inexpensive resistance mutation assays for use in LMICs. Here, using a statistical approach called meta-analysis to combine information from individual patients about the resistance mutations they carry, the researchers investigate the molecular epidemiology of TDR (the patterns of molecular changes underlying TDR in populations) and identify the HIV drug-resistance mutations most responsible for TDR in different world regions.

What Did the Researchers Do and Find?

The researchers identified 287 studies published between 2000 and 2013 from 111 countries that included the reverse transcriptase sequences of HIV viruses from 50,870 ARV-naïve, HIV-positive individuals. The researchers analyzed each virus sequence for the presence of 93 surveillance drug-resistance mutations (SDRMs) previously shown to be specific indicators of TDR. Meta-analysis of these data indicated that the average overall prevalence of TDR (the proportion of ARV-naïve, HIV-positive individuals infected with a virus carrying one or more SDRMs) ranged from 2.8% in sub-Saharan Africa to 11.5% in North America. In sub-Saharan Africa, the odds (chance) of TDR increased 1.09-fold per year following national ARV scale-up; this increase was attributable to an increase in NRTI- and NNRTI-associated resistance. By contrast, in LMICs in south/southeast Asia, the odds of TDR remained unchanged following ARV scale-up. In Latin America/Caribbean, North America, Europe, and upper-income Asian countries, the odds of TDR have increased by around 1.10-fold per year since 1995, mainly as a result of increased NNRTI resistance. Four NNRTI-associated and 16 NRTI-associated SDRMs accounted for most NNRTI- and NRTI-associated TDR, respectively, in all regions. Notably, in sub-Saharan Africa and south/southeast Asia, most of the NNRTI-associated SDRMs detected were associated with high-level resistance to nevirapine or efavirenz. Finally, the researchers report that 95% of TDR viruses in sub-Saharan Africa and south/southeast Asia were unrelated and had therefore arisen independently.

What Do These Findings Mean?

Because many drug-resistance mutations reduce HIV's fitness and tend to be lost rapidly in individuals not exposed to ARV therapy, differences among the datasets used in this meta-analysis with respect to how long each ARV-naïve patient had been infected with HIV before virus sampling may limit the accuracy of these findings. Nevertheless, the finding that most of the TDR strains detected in sub-Saharan Africa and south/southeast Asia arose independently suggests that improved patient adherence to ARV therapy and the use of ARV regimens that contain drugs to which HIV rarely develops resistance (regimens with a high genetic barrier to resistance) should reduce the generation of new ARV-resistant strains and mitigate TDR increases. In addition, the finding that a few NNRTI-resistance mutations were responsible for most cases of transmitted high-level resistance suggests that an inexpensive assay that detects these specific mutations may be useful for pre-therapy screening in LMICs with high TDR levels.

Write the Easy Parts First

- Good bets for knocking off sections are the **Methodology** and **Results** sections
- **Methods:** Carefully track the research protocol, and if you repeat or reproduce a part of the protocol as stated in your original proposal, **do not** paraphrase or change verbiage (PAST TENSE FOR WHAT YOU DID)

Methods: How will you show that A > B?

- Who (what) did you study?
- What, if anything, did you do to them?
- How did you make your measurements?
- How did you compare A with B?
- Statistical tests to “show” that A ≠ B

Methods Checklist: 4 Elements

- Design: Define the type, e.g., retrospective, case-control, RCT, prospective
- Subjects: population, inclusion/exclusion criteria, controls
- Measurements: survey instruments, assays, physical measurements
- Analysis: Statistical plan and rationale

Measurements: A Way to Organize

- Predictors before outcomes
- Medical presentation
  - History, physical, simple lab, complex matters
- Explain odd decisions or missing data
- “Appropriate” level of detail - know your audience

Methods: How to make sadza

- Put mealie-meal in pot. Add cold water to make a paste. ...
- Keep stirring until rakukwata. Cover pot, reduce heat and let it simmer for 15 minutes.
- After 15 minutes, add more mealie-meal bit by bit and mona sadza.
- Be sure to do it well.

Methods: How to make sadza

- Mix 225g of cornmeal with 250ml of water.
- Bring 750ml of water to the boil in a pan, then turn down the heat and add the cornmeal mixture, stirring all the time.
- Cook for five minutes, then gradually add the remaining cornmeal.
- Transfer to a bowl or serve in pan.

Analysis

- Don't list tests: explain *why* you used them
- Tell how measurements became variables
- How did you estimate the effect size?
- How did you determine the precision and significance of the effect size?
  - Univariate
  - Multivariate (say what you adjusted for)

Results: Showing that A > B

- Make sure the main result is obvious
  - Don't bury it in the middle of a long paragraph, an 8 x 6 table, or a complex figure
- Use alternative "definitions" of A and B
  - Different measurement techniques or times
  - "Multivariate" adjustment
  - In various subgroups

Results, continued

Order of presentation:

- Collected sample first
- Follow order of hypothesis, chronology or design elements
  - Simple results before complex
  - Strongest findings first
  - Use subsection headings as a roadmap

Results/Discussion
(Pull out the scribbled list again)

Framing the Content (GENERALLY, PAST TENSE FOR WHAT YOU FOUND)

- What grabbed you about your results?
- Was there an expected or unexpected finding? If you are presenting something new, build the case in a logical order – eg, is this study the result of a long line of similar research that is "confirmatory, but"?
- Is it presenting a new theory to explain an old phenomenon? Is it rebutting a long-held belief in the field?
- Does it have implications for research policy or social policy?
- Will it be a useful "tear-out" with pragmatic clinical utility?

Discussion

- **Actually speak to the reader (PRESENT TENSE)**
- **Argue** your case with the **facts** that you've set forth formulaically in the **Results** sections
- Use ***I.A.C. (Idea - Analysis - Conclusion)***
- Check each paragraph against the next: be certain that you are **connecting the dots** for the readers, not bludgeoning them

Discussion Content

- Highlight key findings as they relate to the study's purpose (what can you say about your hypothesis/null?)
- Evaluate findings in relation to literature
- Discuss limitations
- Conclude with recommendations

Remind them of the question; Signal that it has been answered

THE QUESTION POSED IN THE INTRO:

First-day weight loss is routinely measured for newborns, but no studies have examined whether greater weight loss in the first day predicts subsequent weight loss.

THE ANSWER THAT OPENS THE DISCUSSION:

Our study reveals that newborn weight loss in the first 24 hours is a strong predictor of eventual weight loss during birth hospitalization.

Styling Your Discussion

Using the topic sentences, write stand-alone paragraphs following the "I.A.C." rubric:

- ***I*dea** (the topic sentence)
- ***A*nalysis** (the clinical, microbiologic, biochemical, social, economic, explanation of the result)
- ***C*oncluding** sentence which sums up the analysis, and often will serve as a transition to the next paragraph

Prove your point.

- Infants with weight loss ≥4.5% by 24 hours have an OR of 3.57 (1.75, 7.28) for total weight loss ≥10% prior to hospital discharge in multivariate analysis.
- Even weight loss of 4% by 24 hours is associated with a 2-fold increase in odds of eventual weight loss ≥ 10%.

S-P-E-L-L I-T O-U-T I-N W-O-R-D-S

DOT #1: Since exclusive breastfeeding is an important preventive intervention, and

DOT #2 since weight loss of ≥ 10% is often considered an indication for formula supplementation,

CONNECTION OF DOTS 1 & 2:

infants with high early weight loss should be considered a priority for lactation assistance to promote continued exclusive breastfeeding.

Framing the Wrap-Up

- What grabbed you about your results?
- Was there an expected or unexpected finding?
  - If you are presenting something new, build the case in a logical order – eg, is this study the result of a long line of similar research that is "confirmatory, but"? Is it rebutting a long-held belief in the field?
- Is it presenting a new theory to explain an old phenomenon?
- Does it have implications for research policy or social policy?
-
- Will it be a useful "tear-out" with pragmatic clinical utility?

How the Results Compare to Prior Studies

- Synthesize the results of prior studies – do not review one-by-one
- Objectively describe limitations of prior studies
- Try to explain discrepancies in findings
- State how your results extend knowledge

Segues About Context and Other Interesting Things

- These results are consistent with…
- Our result suggest…
- We believe our findings…
- Why might our results differ from…?
- We made several other observations…

Styling Your Discussion
(continued)

- If you find that you are stuck, and cannot create an I.A.C. paragraph for a particular result, go back to the topic sentence, and make sure that it is worthy of a whole finding/result
- Consider whether you have enough (interesting) results to merit another paper (after this one is completed)

Anticipate Possible Criticism

- **Careful, not defensive, explanation**
- Anticipate critique of your methodology or study design and present the reasoning behind your choices
- Your design and study criteria were well thought out in the beginning – now is not the time to have a crisis of confidence

Strengths and Limitations

- Note strengths and unique features of your study design
  - Do not brag
- Describe limitations and their impact
  - Do not overdo it
  - Note how you dealt with limitations
  - Balance with strengths

Reasonable minds could differ, but…

- If you could do it over…
  - Be reasonable: Don't suggest a randomized double-blind placebo-controlled trial in 20,000 patients if it's not appropriate
- Problems in design, sample, measurements, analysis, interpretation, and why these matter
- Alternatives that you did not address

Set Up Each Limitation

Our study has several important limitations. First, we examined inpatient weights only. Since greater early weight loss could lengthen hospital stay, and since longer length of stay would capture weight nadir for more infants, our results could be biased toward a relationship between early weight loss and subsequent in-hospital weight nadir.

Walk through the alternative

If this were the case, we would expect that infants with higher early weight loss would be more likely to have weights documented subsequently during birth hospitalization.

Confirm that the alternative is not plausible, or less plausible

However, our study showed that infants with higher weight loss at <24 hours were less likely to have a weight recorded at 24-48 hours, and we found no relationship between weight loss at <24 hours and whether or not infants had a measured weight at 48-72 hours, 72-96 hours, or 96-120 hours.

Conclude With a Send-off

- **A conclusion is not a repetition**
- Take the bully pulpit, and set a course
- Set a research agenda; get others interested in your field
- Create some controversy that is well-founded on the basis of your findings

Conclusions and Implications

- What is the take-home message?
- Take a position
- Avoid
  - "Our results might have clinical significance"
  - "The meaning of these results is unclear"
  - "Clinical practice should be totally changed based on these results"

The Implication and the Road Ahead

Infants with high weight loss at <24 hours appear to be at increased risk of greater subsequent weight loss. These infants should be considered for priority lactation support if resources are limited. Further research should explore the relationship between weight changes early in hospitalization and infant inpatient and outpatient outcomes, adjusting for clinical predictors available early in hospitalization.

Some Practical Advice

- **Return to the Instructions for Authors** and re-check formatting requirements, word length, formatting of references, suggested number of references, advice about graphics, the works
- **Print hard copy** of the manuscript, and **proof it** for substance by **reading it aloud once, making hard copy corrections** (you will be amazed at what you will find to self-edit)
- **Then**, and only then, run **spell check**
- **Wait a day**, **re-read**, and with a sigh of relief, **hit the send key** to your co-authors, or friendly readers

Credit Where It I$ Due

"This project was supported by Grant Number KL2 RR024130 from the National Center for Research Resources (NCRR).”

Responding to Reviews, Internal and External

The Hurt Locker

- Read through the reviews twice
- You will be offended by everything the first time, and begin to appreciate some of the merits by the second time
- Consult with your co-authors

Why an initial rejection?

- T not true
- R not relevant
- A not appropriate
- I not interesting
- N not novel

Take a step-wise approach

- **Begin the explanatory *Response to Editor* letter simultaneously with your revisions**
- The tone should be **respectful** but not obsequious
- **Address each comment**, in numeric order, citing to the page and line where you've made the revisions - as relevant, add the **actual** text to the letter once it is finalized in the manuscript
- Where logical, **group comments** so that they are more easily addressed, eg, comments from each of three reviewers that address the same issue in methods, results, or discussion

Comments	Response to comments	Location of change in manuscript
Article I. Essential		
1. The issue of 46% non-response hangs heavy over the manuscript. Certainly the programs will have information on gender and age, and possibly on marital/partner status. This information should be obtained and reported.	This information has been added to table 2.	Page 23, table 2
2. In your response letter you note that you tested a number of interactions that you do not report. Please report the results of these tests, even though not statistically significant.	The results of the additional interactions have been reported in the results section.	Page 11, p. 1
4. Why was Table 3 split into 2 tables? Please revert to the previous single table. Please add table notes that provide the sample size and help the reader interpret the beta weights without reading the text (at a minimum please indicate directionality of scales; see also note below regarding beta weights).	The table has been changed to a single table. Table notes have been added to provide sample size and to help the reader interpret the beta weights.	Page 24, table 3
Please add table notes that provide the sample size and help the reader interpret the beta weights without reading the text (at a minimum please indicate directionality of scales; see also note below regarding beta weights).	size and to help the reader interpret the beta weights.	
5. The revised manuscript is 550 words longer than the original, despite the instruction to keep the length approximately the same. While in some cases the additional words are necessary,	The paper has been revised to eliminate over 250 (edit) words.	

What if the reviewer has completely missed the point?

Consider whether:

- You have presented the idea abstrusely; try rewriting **unless** this undermines the integrity of the idea
- The reviewer (generally an expert in the field, wed to their point of view) a) has a vested interest in **your being incorrect**, b) has just **been proven wrong** by your results, or c) **did not read the paper carefully**

Re-consult

- Check your intra-reviewer-rater reliability
- What if MOM and DAD disagree????
- Get your gumption up, be thoughtful, and **make a decision** - you must resubmit - now’s the time…

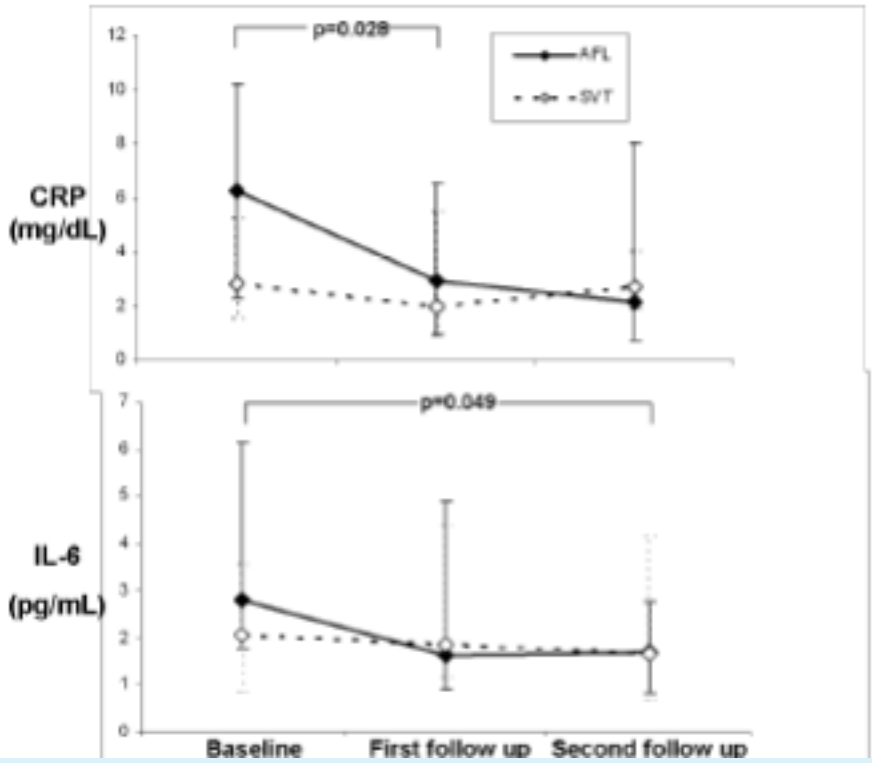
Greg's Reviewer's Misread

Some aspects of the results presentation could be clearer. Some of the presentation of results such as those in figure 3 does not make it clear how many patients were seen at each follow-up visit.

We have attempted to make the results more clear, with a special emphasis on the number of subjects with follow-up. As suggested, we have changed figure 3 so that the numbers of patients at each follow-up visit are clearer and have included those numbers in the figure itself.

Original Figure 3 and Legend

Figure 3. Change in each marker in the atrial flutter (AFL) group is shown in solid lines, and change in each marker for the supraventricular tachycardia (SVT) group is shown in dashed lines. At first follow-up, repeat CRP was significantly lower in the AFL patients (n=26) and was unchanged in the SVT patients (p=0.89, n=36). IL-6 levels were significantly lower at second follow-up in the atrial flutter patients (n=6) and was unchanged in the SVT patients (p=0.10, n=6). P values shown are for the differences in the AFL group only between baseline and first follow-up CRP (top) and between the baseline and second follow-up IL-6 (bottom). Y error bars denote interquartile ranges.



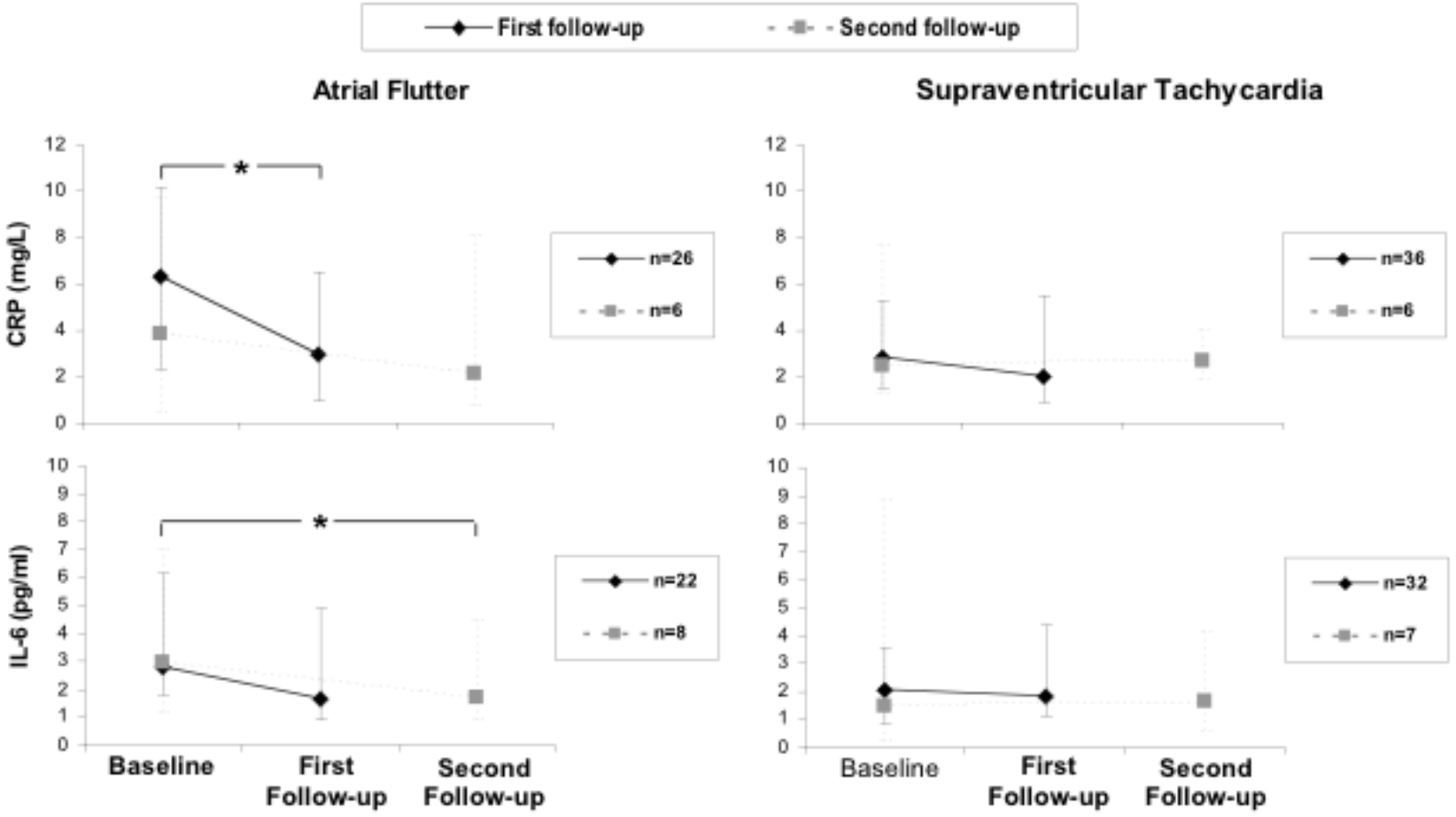

First follow-up
Second follow-up
Atrial Flutter
Supraventricular Tachycardia
CRP (mg/L)
IL-6 (pg/ml)
n=26
n=6
n=36
n=6
n=22
n=8
n=32
n=7
*
*
Baseline
First Follow-up
Second Follow-up

Figure 3.

Response and Lessons Learned

- Dealing with easy fixes, eg, adding the “n=“
- Dealing with the complimentary bombshell

Well, what if the reviewer has *really* missed the point?

- **Tough.** You must explain to the journal editors why it is that you have chosen *not* to revise in accordance with the reviewer's comment, and be prepared to support your point of view.

Shave and a Haircut

- Address stylistic editorial comments *after* the substantive revisions
- Stylistic issues frequently relate to length
- Reduce to tabular or graphic demographic descriptions of subjects, or less intrinsic data and descriptors
- Do not repeat in text what is best presented in a table or figure
- Give your co-authors one last shot, WITH A DEADLINE, then: pull the trigger