

Consulting with a Biostatistician: How to Get Help

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Not everyone who
wields a knife is a
surgeon!



Hierarchy by Statistical Training

- Mathematical statisticians: “white collar”
- Applied statisticians: “blue collar”
 - Includes biostatisticians
- Data analysts or database managers
 - Master’s level statistician training
- Wise consumers
- Naïve consumers
 - Likely victims of “bludgeoning with statistics”



Whom Should You Consult?

- You yourself should be increasingly a wiser consumer!
- Consult other wise consumers
- Routine “how to” questions, application of standard methods, might go to data analysts



Whom Should You Consult, Cont.?

- Complex questions, questions not amenable to “how to” solutions, questions where answers have major repercussions, should go to a biostatistician
- Mathematical statisticians not likely to be willing to consult, and when they do, are often not satisfactory consultants. These are the statisticians’ statisticians



Mathematical Statistician Anecdote



When Should You Consult?

- “You can’t fix by analysis what you screw up by design” (paraphrase of Light et al.)
- Wise consumer: Think through the entire project from beginning to end
- If you can’t foresee each step, get a consult right then!
- Most biostatisticians prefer to practice “preventive statistics” than to do “statistical autopsies”



On What Might You Consult?

- Conceptualization of the research question
- Design
 - How many subjects?
 - When should you stratify?
- Measurement
 - Reliable?
 - Valid?
 - Sensitivity?
 - Don't dichotomize a measure for purpose of analysis



On What Might You Consult, Cont.?

- Analysis
 - Certain number of tools needed
- Interpretation of results
 - Cultural inferences \neq observational study
- Presentation of results
 - Graphs, tables



Interactions With Consultants

- Biostatistical research
- Collaboration
- Consultation
- Teaching



Authorship and Acknowledgement

- Academics are extremely sensitive about authorship issues
- Set up guidelines
- Coauthorship
 - Intellectual contribution vs. consultation
 - Collaboration = coauthorship
- Ask permission for acknowledgement



Payment

- Greatest contribution biostatistician can make is in the process of putting a proposal together
- Percent effort
- Ask about payment BEFORE consultation
- Collegial interaction vs. consultation



Basic Statistical Information

- Take a basic course or two in statistics for basic information:
 - Population versus sample
 - Parameter versus sample statistic (parameter estimate)
 - Descriptive statistics (mean, median, standard deviation, variance, standard error)
 - Normal distribution
 - Basic tests
 - Parametric: t -test, simple ANOVA, simple regression, correlation...
 - Non-parametric: Mann-Whitney, Spearman r , 2x2 chi-square...
 - Statistical hypothesis testing!
 - Significance level versus p -value
 - Power



Education is a Life-Long Process

- Education is a life-long process
 - Learn from the methods sections of papers in your field (both methods to seek out and methods to avoid)
- Seek out and attend seminars describing and presenting new methods, or critiques of old methods
- Learn from your own errors!
- Be willing to give up old methods and try new ones



How To Be a Wise Consumer

- If you cannot understand how the answer was arrived at, do not yet believe the answer
 - It is the responsibility of the authors of a journal article to make the presentation convincing to the readers of that journal
 - Do not be “bludgeoned by statistics”



Publishing Anecdote



Audience Discussion

- Hierarchical Linear Model (HLM)
 - Raudenbush and Bryk
- Become familiar with different statistical packages
- Centering in multiple regression



Audience Discussion, Cont.

- Pilot study
 - Feasibility
- Exploratory study
 - Develop a strong hypothesis
 - Review committees are not impressed with exploratory studies



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