

UCSF School of Medicine  
Department of Epidemiology and Biostatistics

**CLINICAL RESEARCH WORKSHOP**

**FACULTY NOTES FOR SMALL GROUP SECTIONS 1-3**

Tuesdays, July 30 to September 10, 2013

Dear Faculty,

Welcome to the DCR faculty family! We are VERY grateful that you are helping us teach this class!

The following notes were originally created by Steve Hulley, revised over many years with help from Michael Kohn and other faculty, and further revised (with help from other faculty and from students) beginning in 2009 by Tom Newman, Michael Kohn, and Joel Simon.

**General suggestions for small group leaders:**

- **Write an outline of the day's section plan on the board** before the session starts, with an estimate of what time you hope to start each activity. This can help the students keep you and themselves on track. Plus, you get the satisfaction of crossing things off the list as you cover them.
- Pairing up students (1) to get everyone talking, and (2) to increase the amount of individual review (by peers) can be an especially useful learning device. Having to explain research plans to a peer can be very helpful in clarifying ambiguities.
- When a question comes up in class, try to turn it over to the students—get them to answer it (whether or not you know the answer) then get others to comment on the answer before throwing in your own 2 cents.
- Be a vigorous moderator. Don't allow any student (or yourself!) to embark on monologues.
- Learn their names early in the course. They will appreciate your effort to know them, and forgive any lack of success. You may want to snap photos with your cell phone, if it is OK with them.
- All the rooms have black or white-boards, and this is where you should often be, summarizing things while the students are talking. And sometimes it's good to get the students up at the board. Pack some extra Dry-Erase markers or chalk with you in case your room is depleted.

- Most rooms will also have a video connection that you can connect to your laptop to project what is on your screen. While we generally discourage PowerPoint, projecting spreadsheets (e.g., for the sample size session) can be helpful because of the immediate feedback it provides, and projecting examples (e.g., of questionnaires) from the class (rather than bringing in 10 copies) can save paper.
- Assign students (or yourself) to track down issues that come up that are not satisfactorily answered. A glorious fact of life—never discovered by some teachers—is that students like it when you say "I don't know," then resolve things the following week after you or someone else has looked things up. It's helpful to reserve a portion of the board for these loose ends or other things you do not want to forget to come back to later.

Suggestions for specific activities for each session listed below are **OPTIONAL**. We encourage section leaders to be flexible and responsive to their students. These are adult learners who will have opinions about what works and what doesn't. For example, each year some section leaders report that their students did not like pairing up, so they stopped doing it. This year on a trial basis (for the first 2 assignments) we are asking students to write out answers to some of the exercises in the back of the book. We'll need to decide together whether to continue that practice.

### **Homework Assignments**

Each session is associated with a student assignment (usually a write-up of one page or less). We ask students to bring a **paper copy** of the completed assignment to section for discussion, and give them until **midnight Wednesday** to incorporate comments and insights from section and email it to you. You can then make comments using "track changes" and return it within 24-48 hours. The midnight Wednesday deadline prevents the students from working too long on one assignment and gives you time to get it back to them before the weekend, so the course policy is not to accept late assignments. Enforcement of this policy is left up to section leaders, however, so if you choose to be more flexible we will not object.

### **Optional Topics to Cover as "Chalk Talks"**

Some section leaders may opt to take 5-10 minutes during section for a "chalk talk" on topics from the readings such as the following:

1) Study Designs:

Experimental

Observational

Cross-Sectional

Case-Control

Cohort

Studies of Diagnostic Tests (Cross-sectional vs. case-control sampling)

When discussing a study, the students should present it with a standard sentence like *"The [clever acronym] study is a [design] study of the association between [predictor]*

*and [outcome] in [study population].”* (This year they'll get extra practice doing that from exercise 2 of Chapter 1.)

- 2) Variable Types: Categorical (including Dichotomous), Ordinal, and Continuous. Measurement Precision, Accuracy and Validity.

Measures of Disease Association When Predictor and Outcome Are Dichotomous

Risk

Absolute Risk Difference

Relative Risk, Relative Risk Reduction

Odds Ratio and when to use it

Valid Reasons for using OR: Case control study, logistic regression

Invalid Reasons: Farther from 1.0 than RR; looks better

- 3) Sample Size “Ingredients”

Effect Size

Variability (SD for t-test)

Alpha, Beta

- 4) Definition of a confounder, distinction between confounding and effect modification. How to determine whether confounding or effect modification is present. Conditioning on a common effect (see new section in Chapter 9!).

- 5) Key considerations in a randomized controlled trial:

Randomization so groups are likely to be equivalent at baseline

Blinding

of patients and clinicians -- to prevent differential co-interventions

of patients and outcome assessors – to prevent differential outcome assessment.

Minimal losses to follow-up

Intention-to-treat analysis vs. per protocol analysis

Problems with subgroup analysis (ISIS-2 Gemini and Libra example)

- 6) Some basic data management/questionnaire design/data collection form design issues

**Session #1: Research Question and Significance Section**

**Objectives:**

**After this session, students should:**

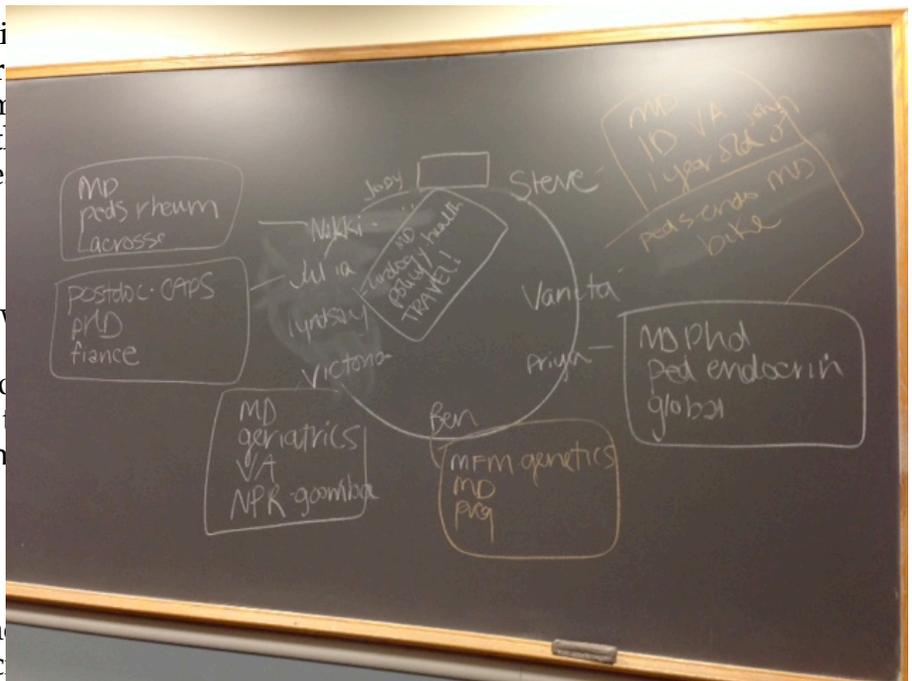
1. Know the name and something else about the section leader and each of the other participants
2. Be able state their research question in a single sentence including study design, predictor variable, outcome variable and subjects
3. Be able to explain to another person in a couple of minutes why their research question is worth answering
4. Know how to name and when to turn in their homework assignment and when to expect feedback

**BEFORE THE SESSION:**

Section 10:10-12:00 (NB. These are only suggestions; feel free to do it your way!)

- Arrange chairs in a circle (a configuration conducive to good interactions) and put a note on the board asking students to sit between two people they don't know.

- 10:10 (5 minutes) Put your email address and cell phone number on the board. The students will email you their first assignment and then you will have their email address. Go around the circle to quickly identify who is there and start learning people's names. I like to draw a circle on the board and write at least the first names of the students to create a name map on the board that people can refer to throughout the session. See photo Jody Steinauer took of her 1st section in 2012.



- 10:15 (10-15 minutes) Ask if there were any questions about exercises 1 & 2 from Chapter 1 of DCR-4; discuss if there is interest. Make sure students know the major study designs summarized in Table 1.2 on page 4.
- Ask about any problems in the Significance sections and with citation management software. Suggest that students get further detailed advice from someone in their home departments, if necessary.
- Any questions about chapters 1 or 2? One option is to walk through the summaries in the book to emphasize key points and trigger discussion.

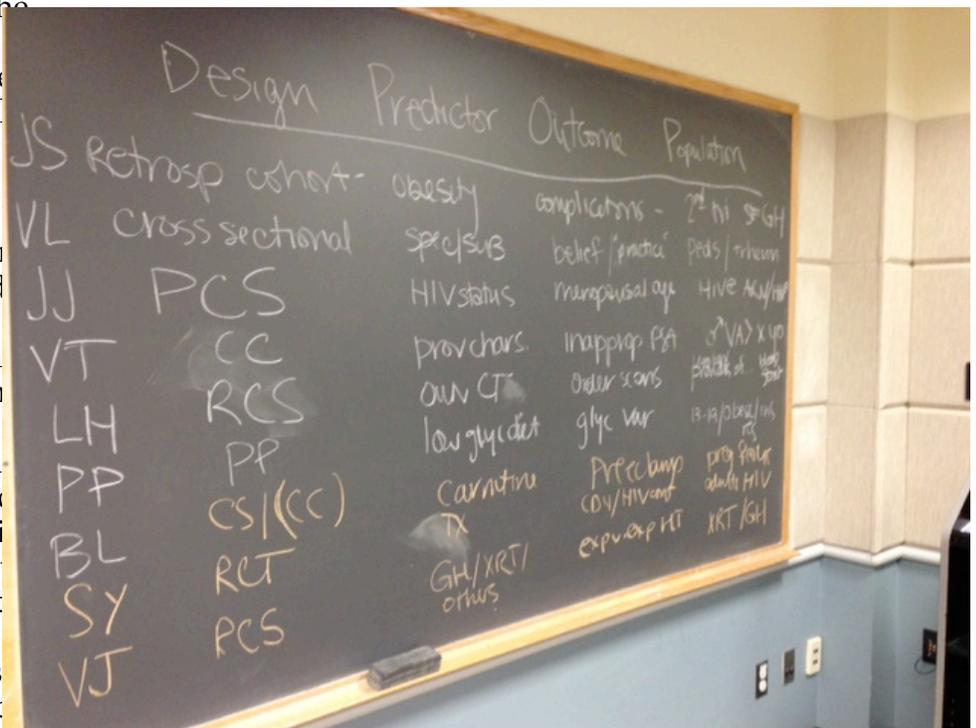
- (5 minutes) Start a table on the board with headings “Clever Acronym,” “Design,” “Predictor,” “Outcome”, “Study Subjects”. Introduce yourself, something about you unrelated to work, and your latest research project using the table headings above:

“The [optional clever acronym] study is a [design] study of the association between [predictor] and [outcome] in study population.

- (20 minutes) Pair up students and refer them to the Introductions Exercise, which we will distribute to you. If there is an odd number of students, join a pair yourself or put three in a group. If you have a student with a language problem, it might take the pressure off if she is in a trio rather than a pair. You may want to collect the Significance sections the students have brought with them and spend your 20 minutes looking through them. (Remind them to switch after 10 minutes.)
- (60 minutes or 11:58 minus current time) Check the time you are starting and the time remaining until 11:58, and ask for a student with a smartphone with a timer to volunteer as timekeeper. Invite a student to introduce his or her partner with 3 well-designed sentences:
  1. Name, academic affiliation, other biographic details
  2. The interesting/unusual fact unrelated to work
  3. The proposed study, including design, major predictor and outcome variables, and population

As she is talking, write the study plan on the board, using the partner and the class to help make sure the single sentence contains (cute acronym), design, predictor and outcome variables, and population (Figure 2, again from Jod 2012)

Then ask the student who study it is to provide some brief and nontechnical background information why this research question is important. If time permits add a few specifics about the study, making notes on the blackboard under the headings: Acronym, Design, Predictor, Outcome, Study Subjects.



Then switch partners, then go to other teams. Limit the time spent on each student so you get through most or all of them in 60 minutes. Let students who got missed know that you will begin with them next week.

- 11:58 Identify loose ends to be reported back. Make sure that the students know to email their assignments to you by midnight Wednesday. You then will provide brief written comments within 48 hours. These can be brief, and are one of our most appreciated teaching devices when received promptly, for use in the next assignment.

**HOMEWORK NAMING.** It will be easier to keep your files for this course organized if the students are consistent in how they name their homework. You can adopt whatever convention you want, but I suggest the format **LastnameHW1**, **LastnameHW2**, etc., which matches other TICR courses. That way when you drag the file from their email to your Epi 202 directory you won't have to worry about naming it and you can look at that directory and see at a glance who has turned in which HW.

**N.B. Please end your section on time**—12 noon—even if not everything has been accomplished. You can carry over loose ends to the next session, and students admire a disciplined course and appreciate being able to go on to their other lives on time. Of course it's OK to linger a few minutes with interested students after class, but don't be too late for the delicious and informative faculty lunch!

Faculty lunch, in Millberry Union East, 3rd floor conference room (Family Medicine Dept.)

- Discussion of problems and triumphs from today's sections
- Review and revise plans for next week

## Session #2: Study Subjects

### **Objectives:**

**After this session, students should:**

- 1. Know the names and something else about the section leader and each of the other participants**
- 2. Be able to summarize their study plan on a 1-page standard outline**
- 3. Be able to explain the difference between Target population, Accessible population, and Sample**
- 4. Write out concrete inclusion and exclusion criteria for their study**
- 5. Understand the rationale and tradeoffs for sampling decisions for their own study and at least 2 other studies in the group**
- 6. Understand sample size ingredients and variable types well enough to use an online sample size calculator**

Section 10:10-12:00 (Again, feel free to design your own variations)

- Put today's schedule and a note on the board asking students to sit next to someone new (so that the pairs will be novel). Arrange chairs in a circle.
- While you're waiting for students to assemble, start a conversation about issues that emerged from this morning's lecture and/or the How Do We Know What We Know presentation.
- (5 min) Start by taking turns having people name the students around the room. You go first, then ask for volunteers.
- (10 min) Follow up on loose ends and exercises from last time, especially issues about the literature review and significance sections.
  - Any triumphs with Pubmed, Endnote or RefWorks? (If there are questions about Endnote or Refworks technicalities, chances are that there are experts in your class who can help out.)
  - Stress the value of becoming a thorough scholar in the chosen area, and of a well-developed significance section.
  - Ask about the How Do We Know What We Know presentation. Did people watch it? Did they think it was excessively anti-industry? Should it be required next year, or just recommended (or neither)?
  - This might be a good time for one of those "Chalk Talks" mentioned at the beginning of these notes. The lecture mentions "Effect Modification," but it goes by fast. You might want to see if any of the students can define it.
- (20 min) Divide the section into novel pairs and/or trios, so that each student has a different partner than in week 1. In each pair/trio, ask that each student spend 10 minutes having protocol parts critiqued—the study outline and the plan for acquiring study subjects.
  - Re the study subjects, tell the students to pay special attention to the issues of internal and external validity, and to consider each of the types of inclusion and

exclusion criteria, as outlined in Table 3.1, (which you might briefly walk through before they start, to refresh memories).

--The distinction between inclusion criteria and corresponding inverse exclusion criteria is somewhat arbitrary. Assure students that they do not have to include the inverse of each inclusion criterion as an exclusion criterion. For example, if they are going to include women aged 50 to 60, they don't have to list age < 50 or age > 60 (or male sex!) as exclusion criteria. Inclusion criteria are usually broad demographic, geographic, temporal, and clinical characteristics. Exclusion criteria are usually more specific clinical characteristics. For example the POINT (Platelet Oriented Inhibition in New TIA) Study has as an inclusion criterion, high-risk TIA with ABDC2 score > 3. An exclusion criterion is that the patient is taking warfarin.

--While the students are talking, you can either participate, or you can do some of your own work. Remind them to switch after 10 minutes.

- (40 min) Ask groups to share their studies as described below. If there were students whose research questions didn't get discussed in the large group in week 1, begin with them and use this assignment to let them introduce themselves and to discuss their projects.

--Have the author present concisely; ask the partner to discuss, invite others to join in.

--NB, the discussion of a particular component of a project (e.g., the plans for acquiring subjects) should always begin with a one sentence statement of the study plan (the single sentence that contains the design, predictor and outcome variables, and population). You may want to be at the board, making notes during the presentation and discussion.

--One thing to be alert to at this early stage is the fact that many students will need to make radical changes in their RQ, and will often not see which way to go. Comfort them—par for the course, everything will be OK in the end.

- (30 minutes) This schedule calls for finishing the pairing up and discussion of study outlines and study subjects after only 75 minutes of section. This is because most students seem to understand issues of generalizability and feasibility. They usually handle definitions of the target and accessible populations and sample fairly well. They have been assigned Chapter 4 on planning measurements, precision, and accuracy, but today's assignment does not deal specifically with these issues. They will return to measurements in two weeks. However, they have a sample size calculation due next week, so spend some time now covering material that will help them with the sample size calculation.
  - For the sample size calculation, they will have to identify their predictor and outcome variables and decide whether they will treat them as dichotomous or continuous, so briefly discuss variable types (categorical, ordinal, continuous, etc.) using Table 4.1, page 33.

- For their first sample size calculation, they need to focus on one predictor and one outcome, and at least one of the two should be dichotomous. This may require making an inherently continuous variable dichotomous.
  - Hook your laptop up to the projector and use one of the online sample size calculators at <http://www.quesgen.com/Tools.php> to demonstrate a sample size calculation. Try to pick a student with a simple dichotomous predictor and outcome and calculate the sample size using <http://www.quesgen.com/SSProp.php>. If you have time, pick a student project where either the predictor or the outcome is continuous and calculate the sample size using <http://www.quesgen.com/SSMeans.php> .
  - Not all the students in your section will be able to follow your example(s), but you should start to soften the territory now.
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- (5 minutes) Field questions about homework for next time; identify loose ends.
  - Remind students to email you the study outlines and plans for selecting subjects by midnight Wednesday, to be emailed back as promptly as possible with your brief comments.

Faculty lunch

### Session #3: Sample Size

#### **Objectives:**

**After this session, students should:**

- 1. Provide a contrasting point of view to the traditional view that studies with < 80% power are not worthwhile**
- 2. Be very comfortable with the 1-sentence study plan summary**
- 3. Have justified the decisions/assumptions they used to estimate their sample size**
- 4. Know how to use a sample size calculator and the tables in the book to estimate sample size, given the decisions and assumptions they justified**

#### Section (10:10-12:00)

- As usual, ask the students to sit next to someone new and design your own variations on the instructions below.
- (10 min) Discuss issues from study outlines and study subject plans that were handed in last time, and any left-over exercises
- (15 min) Discuss this week's lecture, the reading by Peter Bacchetti, and sample size calculations generally. Emphasize that much of the value of setting up the sample size calculation is that it forces investigators to think much more concretely about what they will actually measure in order to answer the research question. Make sure that even those that did not read Peter's article understand the key message – that while many reviewers may expect this, pretending that you are only interested in a large effect size in order to get your power up to 80% does not make a lot of sense scientifically.
- (70 min) We usually don't pair up the students for this session—too difficult. Instead, invite 3 or 4 students to put their work on the board, listing out the predictor and outcome variables, the null and alternative hypotheses, effect size, standard deviation (if necessary), alpha, and beta and their sample size estimate as specified in the assignment. Discuss these one at a time. Consider projecting from your laptop to reproduce the student's sample size calculation. For your convenience, the sample size calculator for comparing proportions is at

<http://www.quesgen.com/SSProp.php>

and the sample size calculator for comparing means is at

<http://www.quesgen.com/SSMeans.php>

- When these first 3-4 calculations have been discussed one at a time, you can have others do the same. Usually about half the students do a fine job on this, and the other half will have something a bit muddled, or will have a study plan that does not lend itself easily to the simplified models in Chapter 6. Sometimes you can straighten things out right in front of them at the blackboard, but it's OK if you need to go back and think about what advice to give on how to do a more

appropriate sample size estimate. You can get counsel from one of the statistical experts at our faculty lunch, then look smart next week. If appropriate, ask them to bring in an improved version next time.

N.B. Many students will have a fixed sample size. In that case it makes sense to estimate the effect size they will be able to detect with reasonable power. Is this effect size reasonable? A common problem, especially when they've done it right, will be the discovery that the study would require more subjects than is feasible. Explore the options in the last few pages of Chapter 6 for increasing power by adjusting the specifications, variables, duration or RQ. If it's back to the drawing board, provide comfort and solace.

- (10 min) Discuss any other issues that have developed, such as in their efforts to use Endnote or RefWorks. Chances are that there are some experts in your class who can help out if you don't know the answers.
- (time permitting) Walk through summaries of Chapters 5 & 6, highlighting main points from lecture and leading discussion of questions that come up.
- (5 min) Field questions about homework for next time, identify students who will bring back new sample size calculations next time.
- Remind students to email assignments by midnight Wednesday, to be returned promptly with comments.
- Remind students to set up a meeting with their mentor.