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The End of Biostatistics in VCU Medical School Curriculum

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Introduction

Incoming medical students (n=200) at Virginia Commonwealth University (VCU) are required to complete a 34-hour, team-taught course in epidemiology (PopMed), of which 6 hours are devoted to biostatistics.

Between 1989 and 2011, at least 7 different faculty from the Department of Biostatistics taught the biostatistics component. Until 2010, all had extensive teaching experience before attempting PopMed and many had received teaching awards. Nevertheless, the course director stated that PopMed student evaluations are invariably bad and characterized the PopMed biostatistician as a sacrificial “lamb.”

I taught PopMed 2010-2011. Unlike my predecessors, I had not taught a course since 2006, as I work full-time in VCU’s NIH-funded Center for Clinical and Translational Research (CCTR).

In 2010, students were confused by powerpoint and responded better when I wrote by hand on paper with a document projector. Accordingly, I determined in 2011 to develop each lecture in real time on a double whiteboard, 15 feet wide and 3.5 feet high.

Syllabus

(1) **Data.** Dataset as sample from a population; observations and variables; variable types; difference between “statistic” and “data”; univariate and bivariate graphical summaries; skewness and missing values.

(2) **Probability.** Basic definitions and rules of probability; conditional and marginal probability; the normal distribution; the central limit theorem for sample means.

(3) **Inference.** “Lady tasting tea”—updated to an individual who claims to be able to tell the sex of a fetus from the way the pregnant woman holds herself—from initial passionate disagreement through power calculations. P value as conditional probability. T test for difference of means. Confidence intervals. Data snooping and the danger of simultaneous tests, illustrated by coffee and pancreatic cancer [McMahon 1981].

An 87-page textbook, developed expressly for this course, complemented the lectures.

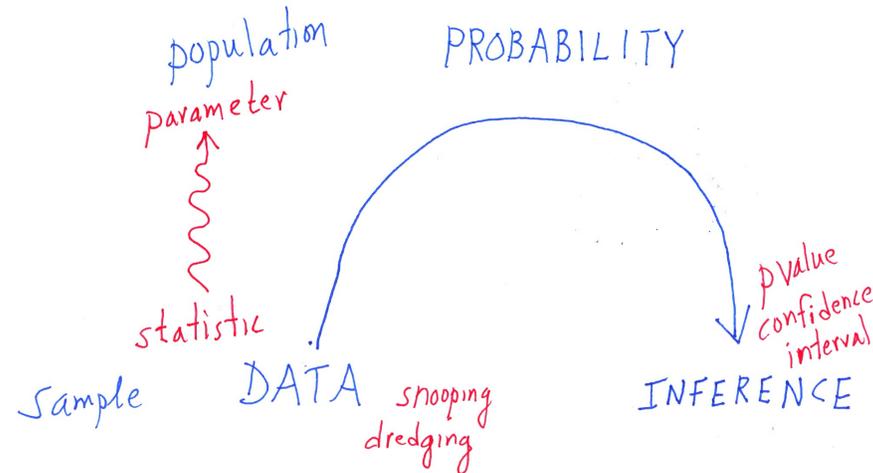
Population vs. Sample

Since clinicians frequently do not understand the meanings of “population” and “sample,” I emphasized the following distinctions:

concrete	↔	abstract
empirical	↔	theoretical
sample	↔	population
statistic	↔	parameter

The Big Picture

The course followed an arc from data through probability to inference, emphasized by a diagram re-drawn every day, to which new terms were gradually added. The following example is from the 5th lecture.



Results

Students unhappy

The students appeared engaged during lecture. But in evaluations, an overwhelming majority stated that someone else should teach biostat next year. They gave high marks for effort and mastery of the material but found the course “confusing” and “disorganized.”

School of Medicine Drops Biostatistics

The faculty in charge of first-year medical school curriculum announced that for 2012, they would seek a clinician to teach the biostatistics component of PopMed. Starting in 2013, SOM will implement a new curriculum, whereby population medicine is integrated into and spread over the entire four years of medical school. To my knowledge, no member of the Biostatistics Department has been consulted in the planning process.

What Students Believed

(1) In a well-organized course, I should not have to take notes during lecture. I should be able to leaf through a text, holding the same material in my hands that I see on the screen.

Thus, they called out to each other during lecture, saying things like, “He’s on page 45 now.” And they interpreted the fact that the lecture did not follow the text page by page as proof that the course was not well organized.

(2) Biostatistical insight is based on simple concepts. These can and should be reduced to a few bullet points.

Thus they were offended that bullet points were not provided.

(3) It is the instructor’s duty to make the material simple.

Thus, a student said to a teaching assistant, “I’ve read the notes five times. Why don’t I get them?”

Acknowledgements

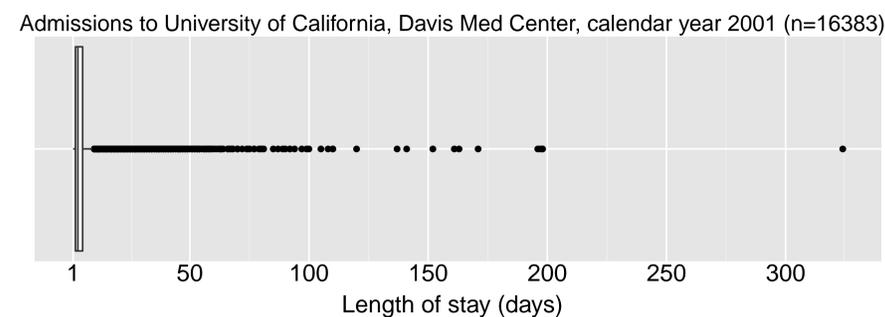
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References

- Fisher RA. The design of experiments. Oxford, England: Oliver and Boyd, 1935.
- MacMahon B. Coffee and cancer of the pancreas. NEJM, 301(11):630-633, 1981.
- Wegelin JA. Lecture notes for Biostatistics portion of Population Medicine class. Virginia Commonwealth University, 2011.

Graphics in the Textbook

Appropriate summaries of raw data



Essential theoretical concepts

The Central Limit Theorem at work on length of stay.

