

Ottawa Health Research Institute



Institut de recherche en santé d'Ottawa



## Challenges: how should we train biostatisticians?

Tim Ramsay

*tramsay@ohri.ca*

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## Outline

1. what is biostatistics?
2. what skills, beyond statistics, do we need?
  - consulting, consulting, consulting
3. what's wrong with what we're doing now?
  - uOttawa/Carleton collaborative biostatistics program
4. what should we be doing?
5. what are your ideas?

## What the hell is a biostatistician?

A **biostatistician** is a statistician who specializes in statistical applications in health-related research. The job requires

- strong statistical skills,
- strong consulting skills, and
- good understanding of the principles of scientific inquiry.

My question:

How should we go about **training** good biostatisticians?

## statistical consultant vs. academic statistician

### Academic statistics:

Define an abstract dataset, along with a set of assumptions, and develop novel methodology/analysis

### Statistical consulting (applied statistics):

Understand a non-statistical scientific question, along with the practical context, and develop appropriate (usually *not* novel) methodology to answer the question

## Understand the scientific question

- Need to understand what the scientist is interested in, and why
- Need to understand the important features of the science
  - need to figure out what those important features are!
- If at the design phase, need to understand what is technically possible
  - what can you measure?
  - what are the limitations of those measurements?

## Develop appropriate methodology

- translate the scientific question into a statistical question
  - this often involves refining the scientific question
- need to pick the simplest possible analysis that will adequately answer the question
  - this may affect what question you ask

## Make appropriate inference

- scientific inference  $\neq$  statistical inference
  - depends on big picture, how the study question relates to the real (scientific/clinical) question

# Ottawa/Carleton collaborative MSc in Biostatistics

Students can enter through any one of three dept's:

uOttawa Mathematics and Statistics

uOttawa Epidemiology and Community Medicine

Carleton Mathematics and Statistics

Degree: MSc with a specialization in Biostatistics

Entrance requirements:

- depends on the department
- each student has to be accepted by two departments

Program requirements:

- depends on the department
- **Mathstat students:** take a couple of epi courses
- **Epi students:** take a couple of mathstat courses

# Challenges

## Epi students

- very basic (nonexistent?) mathstat background
- find mathstat courses very challenging and of limited relevance

## Mathstat students

- find the epidemiology courses very challenging
- get little (or no) contact with applied research

## All students

- do not get experience with consulting

## Result:

- limited enrollment
- high drop-out rate (switch to regular MSc program)

# What do we need to change?

1. all students need strong statistics background
  - grad school is too late to learn math
  - stats students should have a strong interest in health research
2. all students should work on an applied problem
  - should be co-supervised by an epi prof and a math/stat prof
3. need a course focusing on consulting and problem solving
  - learn to communicate effectively with non-statisticians
  - learn to develop statistical solutions to non-statistical problems
  - course should involve collectively developing solutions to
    - design problems
    - analysis problems
    - inference/interpretation problems
  - should involve working collaboratively with non-biostats MSc students
4. need math-based courses specifically aimed at biostatistical methods
5. Different departments (and universities) need to cooperate, sharing credit for MSc students and adequately recognizing teaching activities in a different department (university)

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**We need constructive ideas**