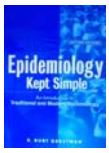
Epidemiology Kept Simple



Chapter 10

Experimental Studies

Introduction

- ***Trials*** - from the French *trier* (to try)
- **Clinical trial** – apply treatments to sick individuals (e.g., chemotherapy trial)
- **Field trial** – apply preventive interventions to healthy individuals (e.g., vaccine trial)
- **Community trial** – apply interventions to aggregates (e.g., fluoridation of public water)

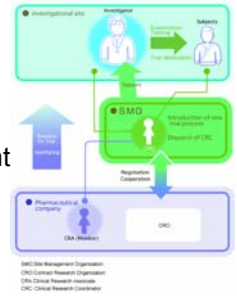
Natural "Experiment"

- Natural conditions change mimicking an intervention
- Paré (1510–1590) ran out of boiling oil to treat wounds ⇒ used an innocuous lotion ⇒ vast improvement
- Not truly an experiment

Selected Concepts

1. Control group
2. Randomization
3. Admissibility criteria
4. Outcome ascertainment
5. Ethics

All except #2 also apply to observational designs



Element 1. Control Group

The effects of an exposure can *only* be judged in relation to what would happen in its absence

A suitable control group is always needed

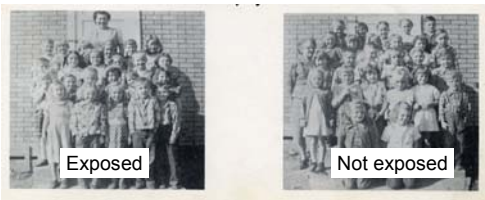
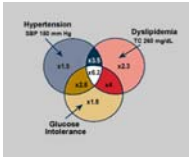
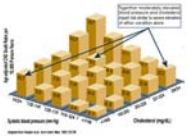


Illustration: *"MRFIT"*

- Multiple Risk Factor Intervention Trial
- Exposure: Health education vs. no special intervention
- Outcome: CVD
- Treatment group experienced dramatic declines in CVD,
- **So did the control group**
- Effect of the intervention was nil (rates were declining in all groups in the late 1970s)





Effects from inert interventions

Placebo effect – improvement associated with inert interventions

Hawthorne effect – improvement due to observation

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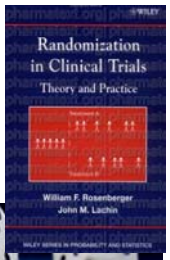
Element 2. Randomization

Randomization works by balancing extraneous determinants, thus mitigating confounding



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How randomization works

- Population: lab rats
- Exposure: diet
- Outcome: weight gain
- By chance: some faster-growing rats end up in one group or the other
- Randomization encourages equal numbers of fast-growing rats in each group

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Polio Field Trial (1954)

Polio rates (per 100,000)

Placebo	69
Refusers	46
Vaccinated	28

Note: Had refusers been used as the control group, the effects of the intervention would have been underrated (*Am J Pub Health*, 1957, 47: 283-7)

Dr. Jonas Salk, 1953

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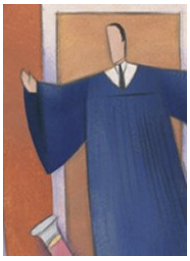
3. Admissibility Criteria

- Restrict participants to those with uniform characteristics
- Example: Exclude smokers from the study base to prevent confounding from smoking



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4. Outcome Ascertainment

- Without meaningful classifications, you have GIGO
- Two types of misclassification
  - nondifferential
  - differential
- Blinded ascertainment encourages non-differential misclassification

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Element 5. Ethics

- The *Belmont Report*
  - Respect for individuals
  - Beneficence
  - Justice
- IRB oversight
- Informed consent
- Equipoise

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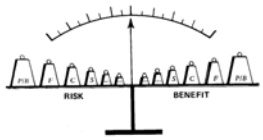
Equipoise

- **Equipoise ≡** balanced doubt
- Cannot knowingly expose a participant to harm
- Cannot withhold known benefit
- What's left is balanced doubt



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