Cognition/ADRD work using secondary data

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Data collected for other purposes

- Public datasets: HRS & int’l, NHATS, NSHAP, & many many others
- Secondary analyses of trials
- EMR/billing/administrative
Clinical research first love: secondary data

• It’s great if:
  • Limited time
  • Limited budget
  • Asking a question with ethical implications
  • Able to compromise

• It isn’t perfect:
  • Quantity isn’t a problem...quality often is.
  • Important outcomes or variables may not be available
  • Statistical analysis is far more complicated AND far more important than in trials
Evolution of a research question

• Does surgery/anesthesia cause cognitive decline in older adults?

Randomize to get/not get surgery & test cognition over time

Get a cohort with & without surgery and test cognition over time (before and after)

Use someone else’s cohort of people, with cognition measured over time, and find what I need in it
Evolution of a research question

- Does surgery/anesthesia cause **cognitive decline** in older adults?
- Does surgery/anesthesia cause long-term memory ↓/ ADRD in older adults?

- Older adults
- Long-term
- Cognition

Composite “memory score” – modeling will be easy, interpretation tricky
Evolution of a research question

• Does surgery/anesthesia cause cognitive decline in older adults?
• Does surgery/anesthesia cause long-term memory↓/ADRD in older adults?
• Is CABG associated with different long-term memory↓/ADRD compared with PCI in older adults?

PCI AVOIDS:
- Sternotomy (trauma)
- Chronic pain
- General anesthetic
- CPB exposure
- Mechanical ventilation
- ICU stay
- Postoperative delirium

Severe CAD

CABG

On-pump

PCI

Off-pump

Hypothesized to CAUSE cognitive decline
• $12m for 10y of cognitive trajectories
• $75k/yr x 2y for 2ary data analysis
Pre-procedure biennial assessments
Memory score; dementia probability

Participant undergoes CABG or PCI

Post-procedure biennial assessments
Memory score; dementia probability

Time (years): -4 -2 0 2 4

CABG?

PCI?
Figure 2. Adjusted Linear Mixed-Effects Models for Memory Score and Dementia Probability for CABG vs PCI Recipients

A Memory score

- CABG PCI
- CABG
- PCI

B Dementia probability

- PCI (preprocedure n = 1001)
- CABG (preprocedure n = 652)

Memory score vs Time from baseline to pre- and postinterview, y

- PCI
- OPCAB
- Trad CABG

9.6%
Was it REALLY that easy?? Nope.

• Sophisticated 4-arm control strategy to address potential for spurious model findings
• Two methods of confounder adjustment, plus other sensitivity analyses (long Supplement!)
• Reviewers:
  • We don’t like this “memory score” thing
  • No causal inference allowed
  • Analytic recommendations

Ultimately: This study could not have been done any other way (not by me, certainly!).
Is secondary data right for you?

• Mentors experienced with your dataset of choice are key.
  • I found my mentor and my data, and THEN my question
  • Knowing what’s in your “big data” is a learned skill, especially when it comes to cognition!

• Do you have a flexible question?
• Prove to me there isn’t a better way to do this.
  • Takes too long
  • Too expensive
  • Ethically problematic

All 3 is best!
Thanks!

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