Video 5 - Quasi-experimental studies

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Learning objectives

1. To contrast the features of a quality improvement study with a research study
2. To describe the various quasi-experimental approaches

Required reading

1. Chapter 6 (also re-read Chapter 5)

Optional reading

Mike Evans. Quality Improvement in Healthcare. YouTube, November 26, 2014. Available as a video (11 minutes).

Health Resources and Services Administration. Quality Improvement. Available in PDF format.

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What is quality improvement? (1 of 4)

- Variety of names
  - Agile
  - Continuous Quality Improvement (CQI)
  - Kaizen
  - Lean
  - Quality Control (QC)
  - Six Sigma
  - Statistical Process Control (SPC)
  - Total Quality Management (TQM)
- Different from Quality Assurance

What is quality improvement? (2 of 4)

- Historical roots
  - Walter Shewhart (1920s, General Electric)
  - W. Edwards Deming (1950s, Japan)
  - Brent James (1990s, Intermountain Health Care)

What is quality improvement? (3 of 4)

- Systematic approach
  - Commitment to teams
  - Organization-wide support
  - Passion for measurement

What is quality improvement? (4 of 4)

- Differences from research
  - Systems approach
  - Little or no attention to generalizability
  - Continuous and cyclical process
  - Major reliance on quasi-experimental studies

The SMART approach

- SMART
  - Specific
  - Measurable
  - Achievable
  - Relevant
  - Time Bounded
- [Who] will do [what] resulting in [measure] by [when]
  - Minnesota Department of Health

The PDSA cycle

- Plan
- Do
- Study
- Act

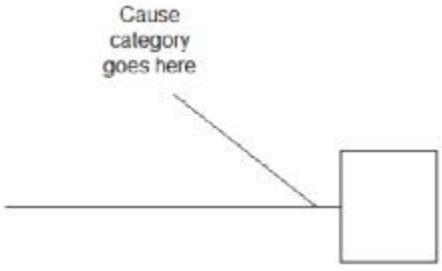
Process, outcome, and balancing measures

- Outcome measures
  - Direct measure
  - Low signal to noise ratio
- Process measures
  - Delivering what you promised
  - Understanding the WHY
- Balancing measures
  - Unintended consequences

Drawing a fishbone diagram (1 of 3)

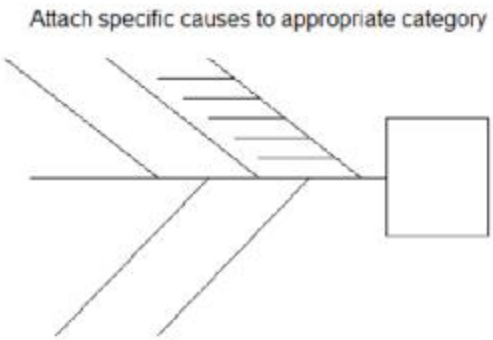
First step in drawing a fisbone diagram

Drawing a fishbone diagram (2 of 3)



Second step in drawing a fisbone diagram

Drawing a fishbone diagram (3 of 3)

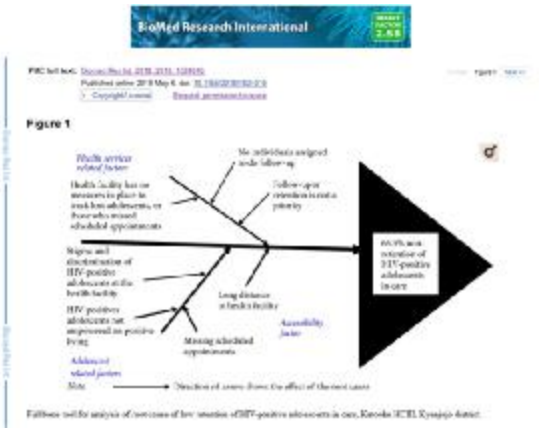


Third step in drawing a fisbone diagram

Fishbone example (1 of 4)

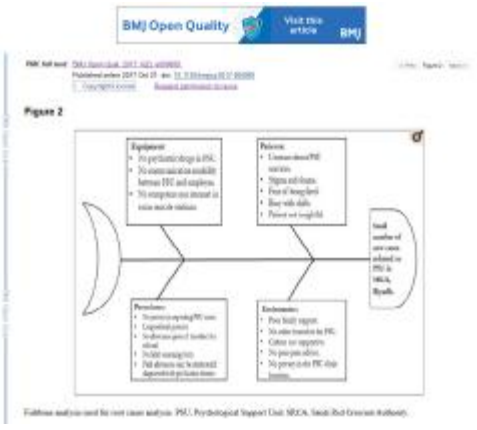
Fishbone diagram

Fishbone example (2 of 4)



Fishbone diagram

Fishbone example (3 of 4)



Fishbone diagram

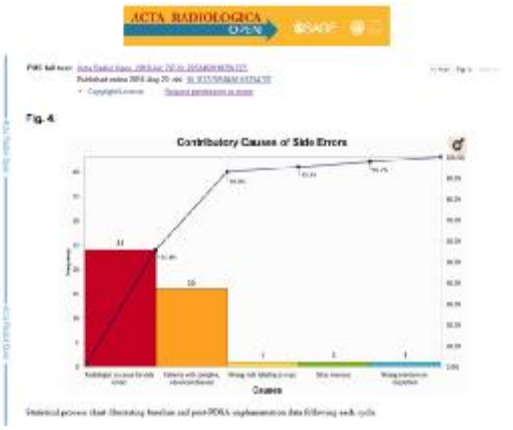
Fishbone example (4 of 4)

Fishbone diagram

The Pareto chart

- Based on the Pareto 80-20 principle.
  - The “frequent few”
- Proportion of cases associated with a specific cause.
  - Combined with cumulative frequency

Example of Pareto (1 of 3)



Example of a Pareto chart

Example of Pareto (2 of 3)

Example of a Pareto chart

Example of Pareto (3 of 3)

Example of a Pareto chart

What is a quasi-experimental study?

- Could but does not use randomization
- Never sneer at quasi-experimental studies
  - Make a loud mistake
- Problems with randomization
  - Cost
  - Logistical constraints
  - Contamination
  - Small n
  - Difficult to get buy-in

Notation for research designs

- O means a measurement is made
- X means an intervention is given.
- ~X means no intervention or a control intervention
- R means randomized assignment
- NR means non-randomized assignment
- E means the experimental group
- C means the control group

Example of a design

```
R E: O1 X O2   O3
R C: O1   O2 X O3
```

Single group post-test only design

NR E: X O

- Simplest design
- Useful for pilot work

Single group comparison post-treatment to baseline

NR E: O1 X O2

- Allows a comparison.
- Confounded with temporal trends.

Two group comparison, without a baseline

```
NR E: X O
NR C:   O
```

- Nonrandomized comparison
- Confounded with baseline imbalance

Two group comparison with a baseline

```
NR E: O1 X O2
NR C: O1   O2
```

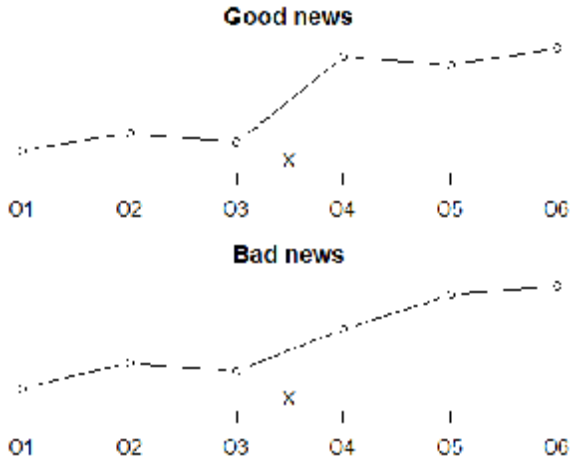
- Best design so far.
- Can check for
  - temporal trends in the control group.
  - baseline imbalances
- Cannot check for unmeasured covariates
- Cannot check for treatment interaction

Interrupted time series design

NR E: O1 O2 O3 X O4 O5 O6

- Best with three or more measures at baseline
- Check for most temporal trends

Hypothetical patterns in the interrupted time series design

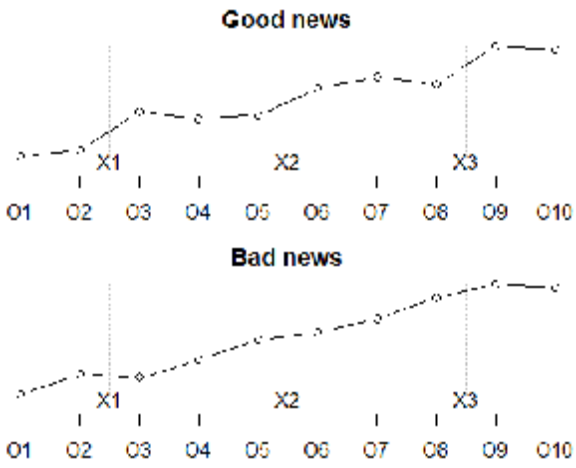


Phased design (1 of 4)

NR E: O1 O2 X1 O3 O4 O5 X2 O6 O7 O8 X3 O9 O10

- Split intervention into three or more pieces
- Phase in the intervention piece by piece

Phased design (2 of 4)



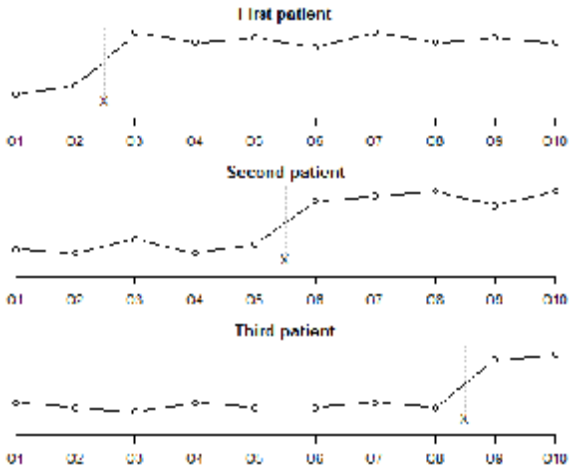
Phased design (3 of 4)

```
NR E1: 01 02 X 03 04 05   06 07 08   09 010
NR E2: 01 02   03 04 05 X 06 07 08   09 010
NR E3: 01 02   03 04 05   06 07 08 X 09 010
```

– Wait for your turn.

– Useful for very small sample sizes.

Phased design (4 of 4)

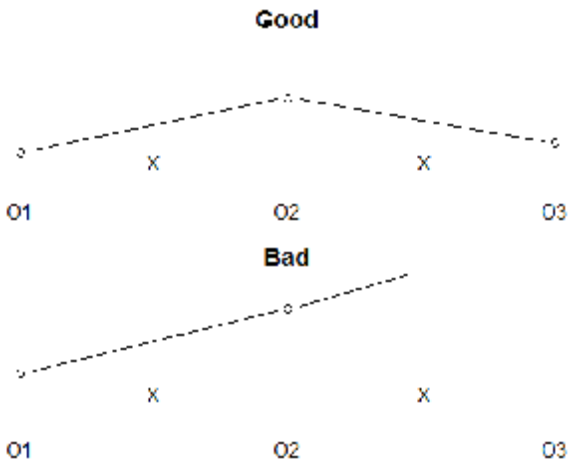


Withdrawal design (1 of 2)

NR E: O1 X O2 -X O3

- Measure
- Add the intervention
- Measure again
- Withdraw the intervention
- Measure one more time

Phased design (4 of 4)



Assignment

1. Respond to the two discussion board questions. Due Monday, February 25 at midnight.
2. continue work on your literature review, which is due on Friday, March 8 at midnight.

Discussion questions

(Extra credit) Find a resource not listed in the optional readings that discussed quality improvement methodology or quasi-experimental designs. Include a link to the resource, if the full free text is available, or attach a PDF if the resource is behind a pay wall.

1. Read one of the optional readings for week 5 and prepare a brief summary (3-4 sentences)

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