RAND HEALTH

Evaluating Disease Management:

Developing the Attribution Strategy (or how to get the right hand side right)

Preconference Workshop

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Overview

- When change isn't caused by what you changed – the tricky issue of attribution
- Some examples
- Summary and recommendation

Why Attribution is so Difficult

- **Intuitively, measuring something before and after introducing an innovation should give you the impact of the intervention**
- **I would be without a job if it were so easy**
- **Powerful forces other than the innovation can lead to substantial changes:**
  - **Secular trend**
  - **Regression to the mean**
  - **Bias**
- **It is also possible that they *disguise* the effect**

Terminology

- Attribution issues are also referred to as threats to validity
- Internal validity means that estimates do not accurately effect the intervention effect
  - Bias, should be avoided
- External validity means that estimates derived in an evaluation cannot be generalized to situations outside that evaluation
  - Tends to be a particular problem with randomized trials
  - Almost always the case with pilot programs but magnitude of the problem varies
  - Cannot always be avoided but should be kept in mind

Secular Trend

- If you assume that a pre-post measurement gives you the intervention effect, you implicitly assume that nothing would have changed in the absence of the intervention
- In health care, this is almost always wrong
  - Care gets more expensive
  - Patients get sicker
  - Quality improves
- You need at least an estimate for this trend to correctly identify the intervention effect

Regression to the Mean

- Many, especially the high-cost, events in healthcare are non-recurring (fortunately)
- Even without any changes, cost is likely to return to its long-term trajectory
  - Particular problem in CDM evaluation
- These effects are not confined to cost and utilization:
  - Acute events change patients' behavior
  - Patients receive more attention and scrutiny after acute events

Today's Selection of Biases: Selection

- Participants in an intervention may be systematically different from non-participants
  - Observable: age and sex
  - Potentially observable: disease severity
  - Non-observable: motivation
- Those differences may interact with the intervention in a peculiar way
- This can overstate or understate the intervention effect
- Particular problem with results from pilot programs:
  - Pilot sites tends to be top performers
  - Pilot patients can more attention
  - Pilot participants tend to be more engaged

Today's Selection of Biases: Measurement, Reporting and Ascertainment

- **Participants in an intervention typically receive an unusual degree of attention, especially in the pilot phase**
  - **More data will be collected**
  - **Greater attention will be given to data quality**
  - **Patients pay more attention to questions and surveys**
- **Incentives may amplify this problem**
  - **Non-financial incentives matter, too!**
- **This may make those patients look different than they would look under routine conditions**

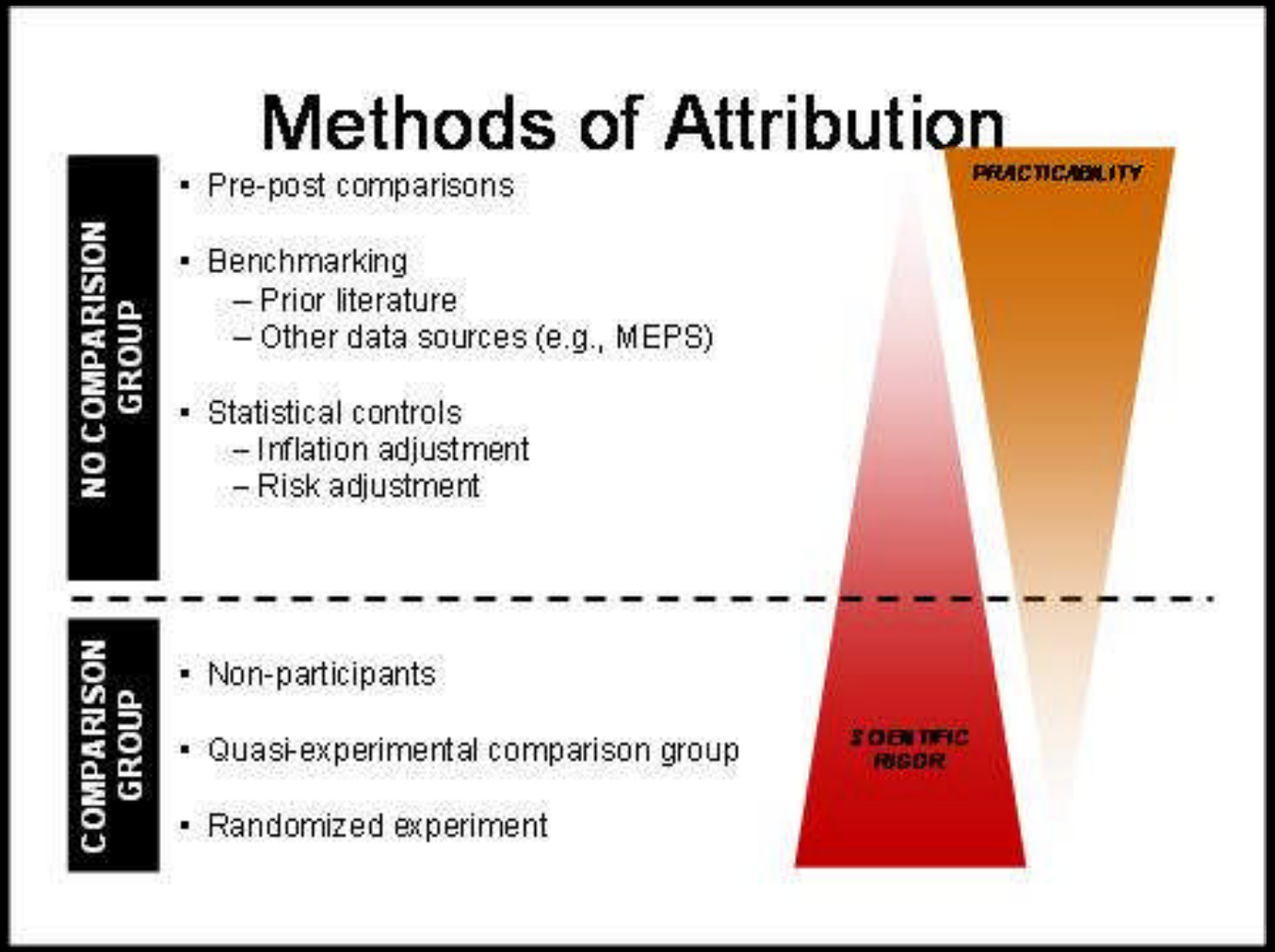
Today's Selection of Biases: Hawthorne Effect

- **Attention involved with the introduction of an innovation may distort behavior**
  - **Providers will be more focused and diligent**
  - **Patients will be more likely to follow guidance and take initiative**
- **Also known as Heisenberg Principle**
- **Implies that intervention effect may be unspecific and non-sustainable**

What We Have Learned

- **Failure to pay attention to the attribution issue can lead us to mis-estimate the intervention effect**
  - **Promote ineffective approach**
  - **Ignore promising innovation**
- **A perfect solution may not be possible, but the issue should not be ignored**

The Universe of Comparison Strategies



Selecting the Analytic Approach

- Comparison strategy deal with the issue of identifying the intervention effect, analytic design with the estimating its magnitude
- Too complex to be discussed here
- Numerous techniques are available
  - Difference-in-differences
  - Regression discontinuity
  - Propensity scores
- Functional form needs to be specified correctly
- But even the best statistical model cannot fix fundamental design flaws

Some Considerations on Selecting an Attribution Strategy

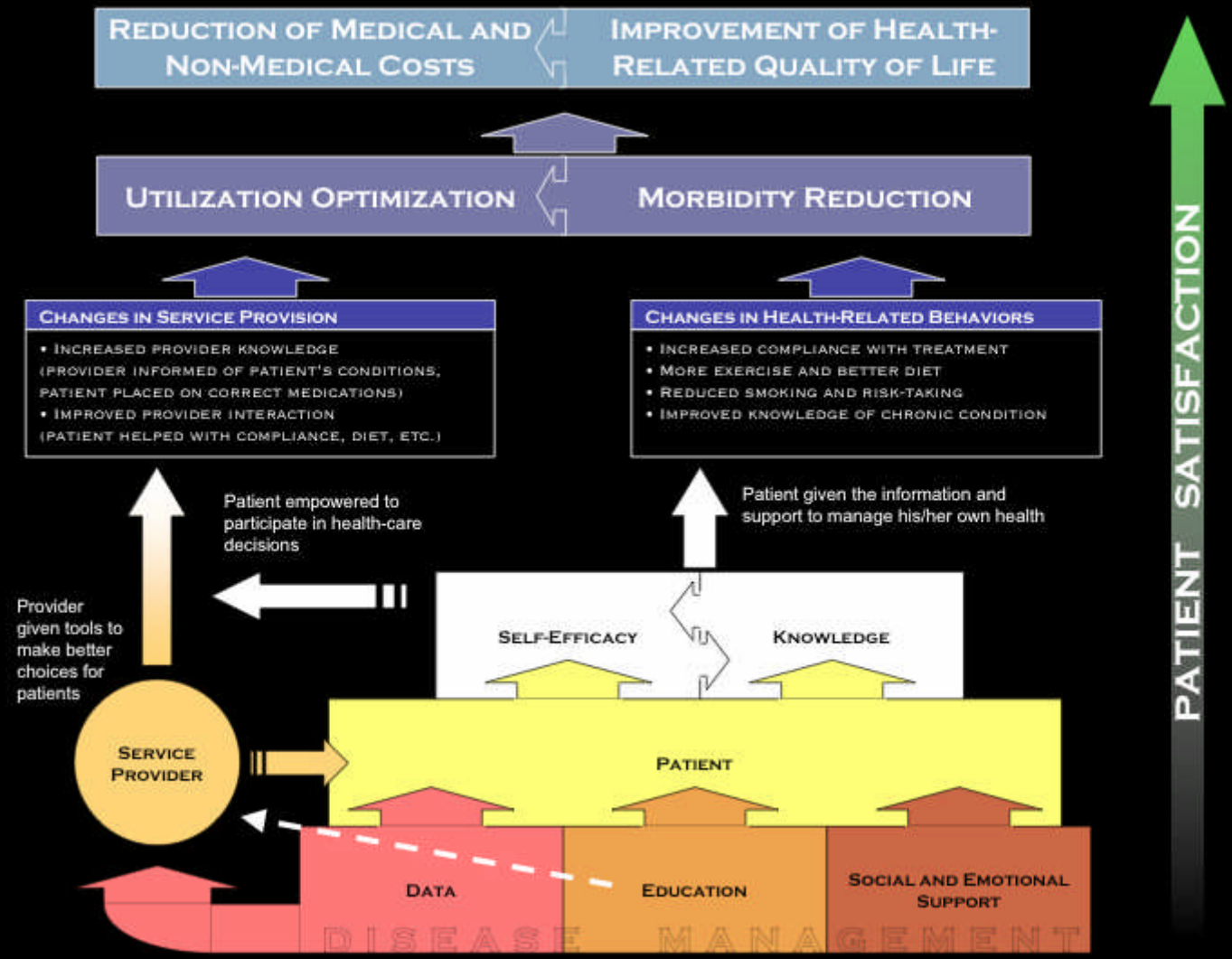
- **There is an inherent trade-off between scientific rigor and feasibility**

- **Form follows function, not always is maximum rigor warranted**

Strategies to Ensure Validity

- As the first step of the evaluation, develop a logic model or conceptual framework
  - This is your view of the world
- Think about which domains will be affected by the intervention, in which sequence and which timeframe
  - Equivalent to your research hypothesis
- Develop plausible (preferably evidence-based) expectations of the effect size
- This is particularly important if the attribution strategy is weak

Conceptual Framework



Some Helpful Hints in CDM Evaluation

- **It's primary mode of action is to increase use of secondary prevention services to reduce high-cost exacerbations**
- **The short-term effect is predominately on utilization patterns, real health improvement takes much longer**
- **If the evaluation does not show those patterns, the results cannot be trusted**

Spot the Error 1

- **Disease management program for CHF claims $75 savings PMPM**

	Before	After
Cost PMPM	$496	$421
Hospital admissions (PMPY)	42	43
Office visits (PMPY)	131	127

Spot the Error 2

- **Disease management program for asthma claims $44 savings PMPM or an ROI of $4:1 at $11 PMPM program cost**

	Before	After
Cost PMPM	$138	$94
Hospital admissions (PMPY)	1.5	1.6
ED visits (PMPY)	8.2	7.9
ICS use rate	56%	61%

Summary

- **Attribution is a critical issue that must not be ignored**
- **Numerous threats to validity can lead you into the wrong direction**
- **But the worst mistakes can usually be avoided**

Recommendations

- Think about it in advance
  - Finding a comparison group ahead of time is so much easier
- Pay close attention to event rates
- Be honest to yourself and test your hypotheses
- Don't expect miracles
  - Results that are too good to be true probably aren't
  - It's hard to truly reduce cost or improve health status with CDM (but it's better to die trying)

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