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Defining the Research Question: Finding the right answers starts with finding the right questions

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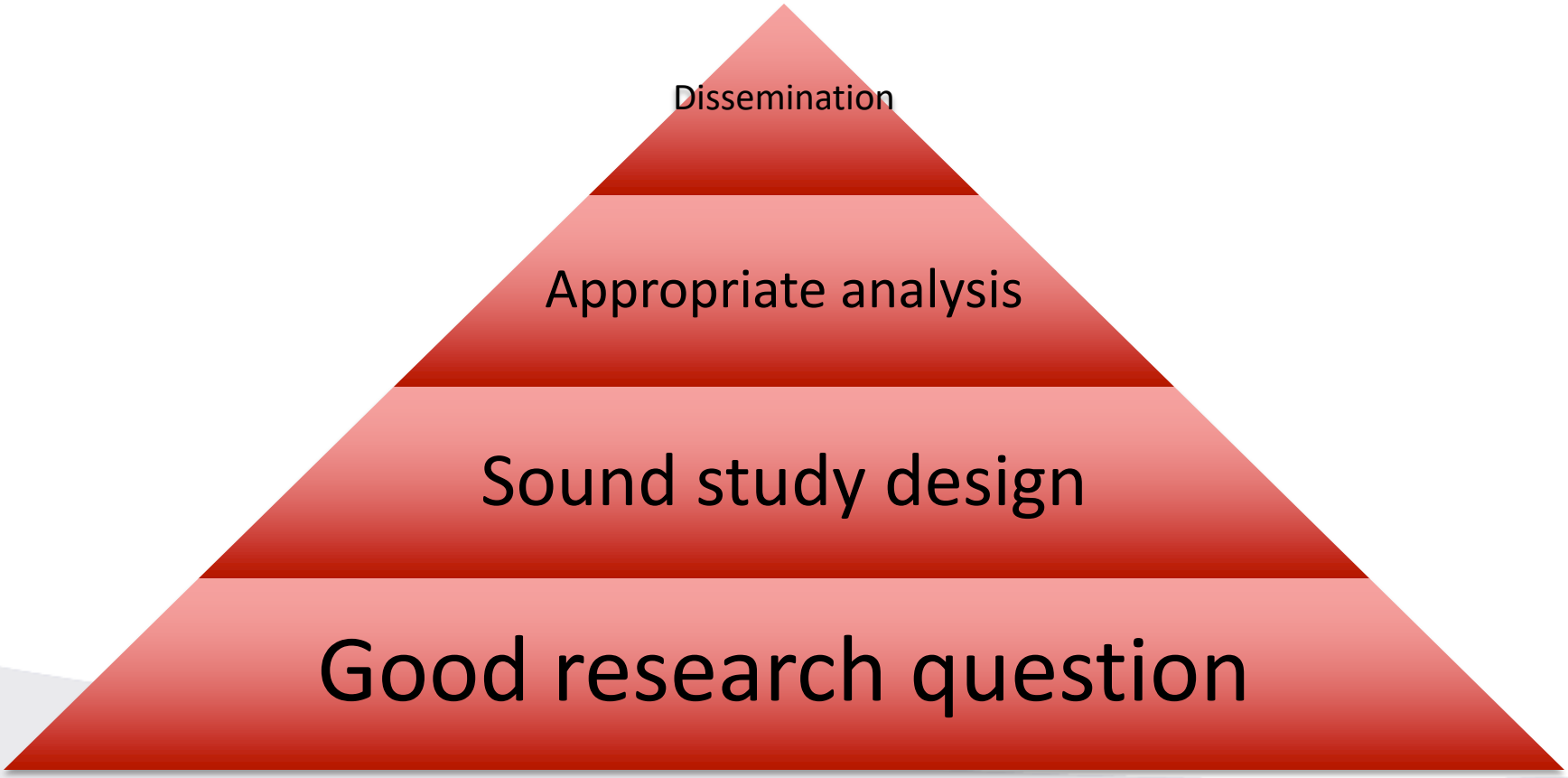
Overview

1. Learning objectives
2. Why do we need a good research question?
3. How do we develop one?
   - Have lots of interesting questions
   - Select the best one for research
   - Turn the question into a testable hypothesis

Learning Objectives

1. Identify critical components of a research question
2. Identify strong and sub-optimal research questions
3. Formulate a good research question
4. Tie a good research question to a testable statistical hypothesis

Impactful Research



Consequences of Ill-Defined Research Questions

- Unwritten manuscripts
- Wasted time and resources
- So what? research

An anonymous poll

Have you participated in a research project where you didn't have a clear idea what the goal was?

1: Yes, I have

2: No, I never have

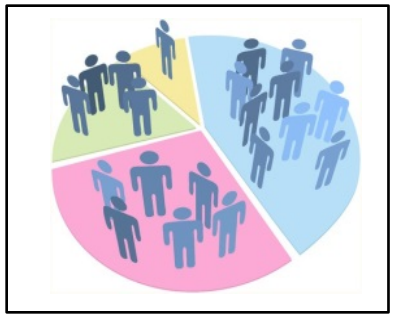
Just one personal example

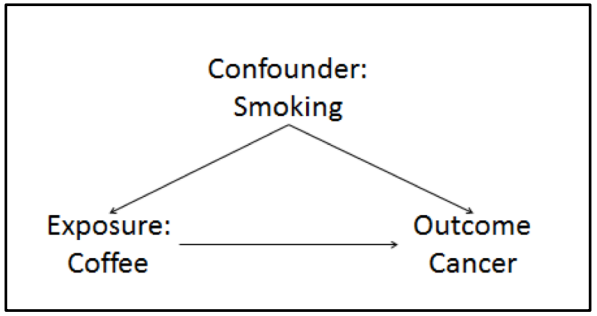
Picture it…

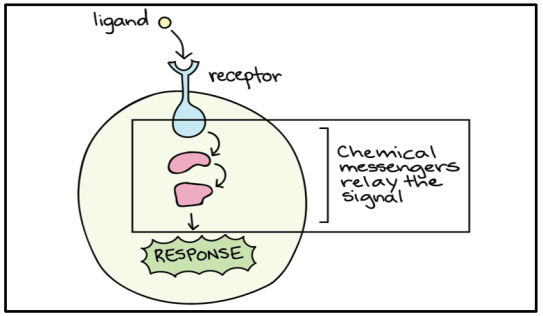
SHEA, 2008

"Impact of Dialysis on Mortality in Healthcare Onset and Community Onset Healthcare-Associated Staphylococcus aureus (HA-MRSA)"

Purpose of Practice-Based Research







Finding a Research Question

1. Area of personal interest
2. Area of institutional (or funder) interest
3. Impact (ARI vs. Leprosy)
4. Gaps identified by national leaders

Because we've always done it this way…

"If you always do what you've always done, you'll always get what you've always got"

- Henry Ford

or Mark Twain

or possibly Albert Einstein

**also sometimes attributed to Tony Robbins*

Another Poll – Shots on Goal

Do you have a forum for generating and discussing research questions with your colleagues?

1: Yes, I do

2: No, I don't

Good research questions are:

1. Answerable (at least in part)
2. Specific
3. Important

Answerable research questions

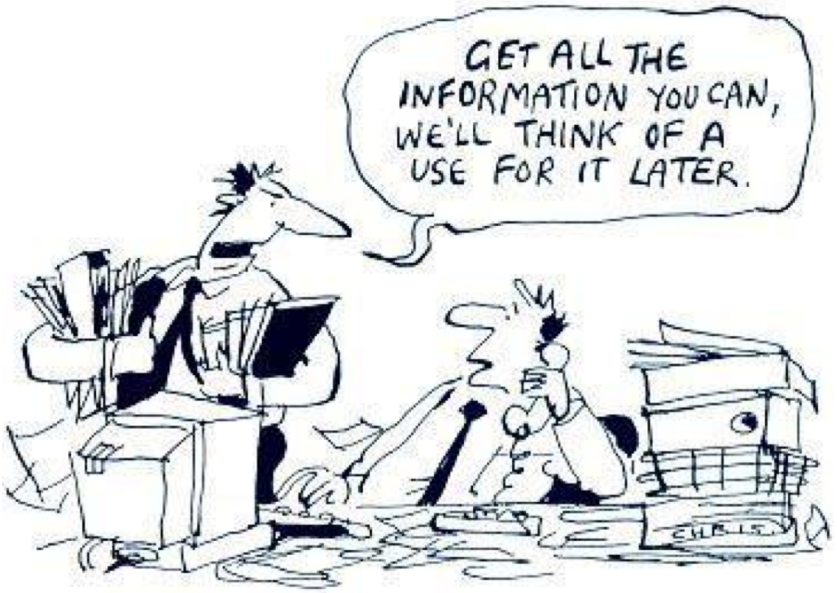
- A logical progression from what is known or believed to that which is unknown or requires validation

- Testable through a research hypothesis

EE Lipowski. Am J Health-Syst Pharm. 2008

Research hypotheses

- A prediction that answers the research question
- Specified before you start
- Should be testable



Example

Question: Is there an association between prescriber beliefs about the prevalence of antibiotic resistance and the use of broad spectrum antibiotics?

Hypotheses:

H_0:

H_A:

Specific research questions

When research questions are too broad, they may be difficult to answer

Which factors contribute to increasing rates of CDI?

- Where?
- When?
- Are we sure that there is a problem?

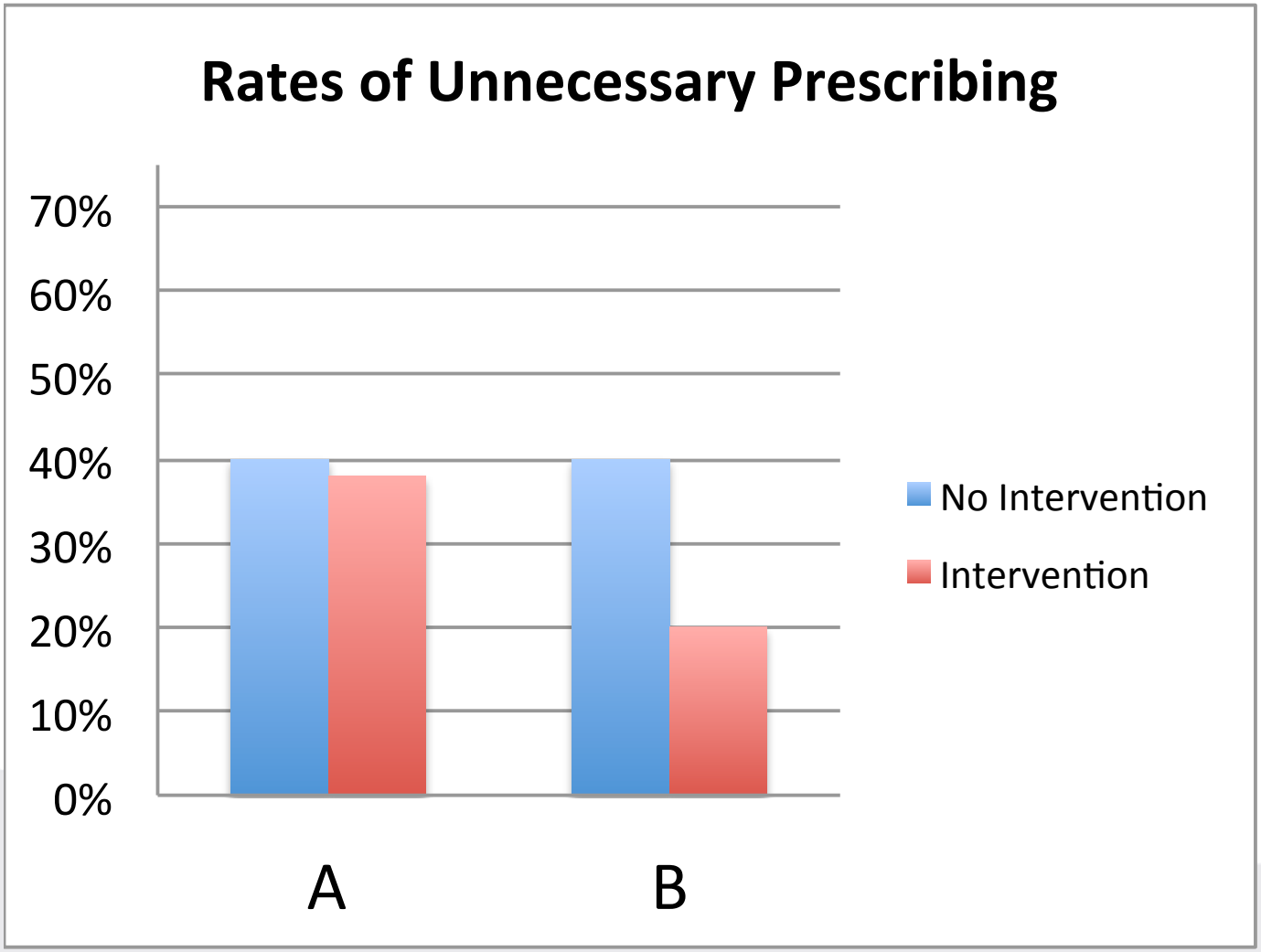
Important research questions

Helps to avoid the So What? research situation

4 S's:

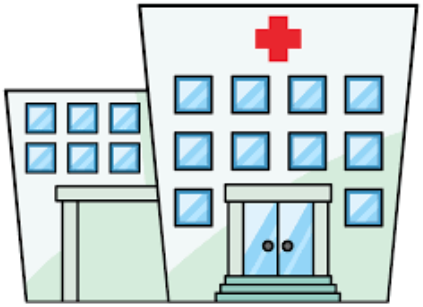
- Size
- Scope
- Scalability
- Sustainability

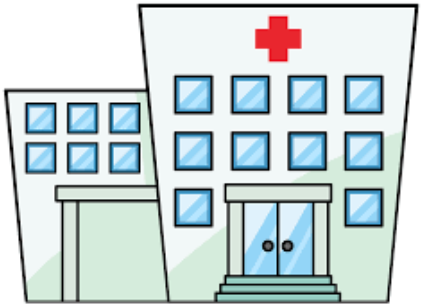
Size (Effect Size)

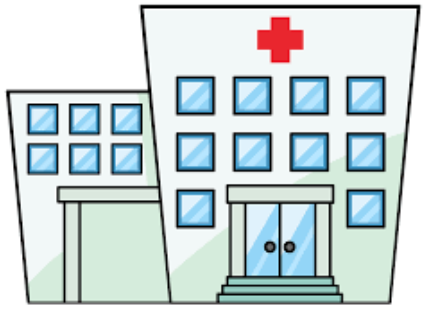


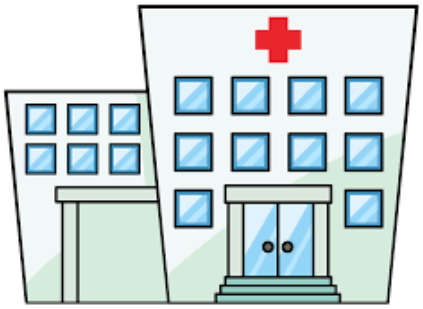
Scope

How much will the proposed research impact existing practices?





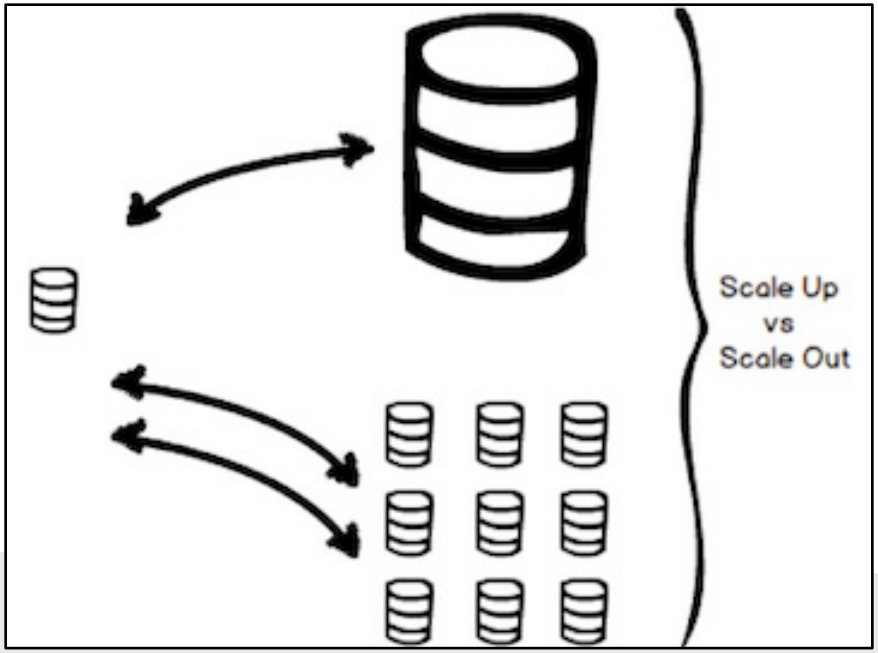




Scalability

How easy would it be to take your results and expand them to a larger group?

And how?

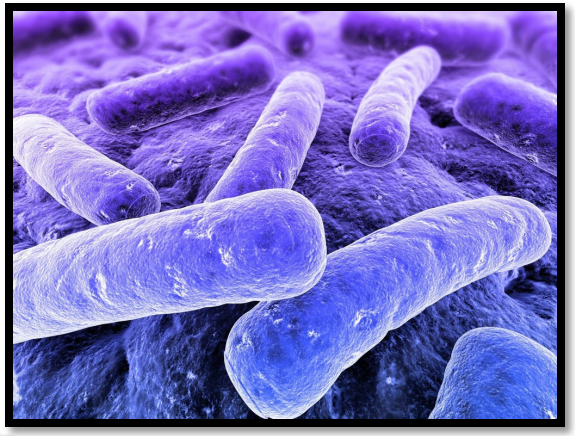


Sustainability

Can the program run without additional resources?

Scenario for your consideration

Hospital with a perceived “problem” with CDI.
Can we use research to improve the situation?



Questions

- Has the incidence of CDI increased at this institution between January 1, 2013 and December 31, 2016?

- Did the change in formulary policy in 2014 influence the rate of CDI at this institution?

More Questions

- What were the risk factors for CDI at our institution during the outbreak period?
- Does excess duration of antibiotic use increase the risk of CDI at our institution?
- …

Conclusions

- A good research question serves as the foundation for impactful research
- A good question should be answerable, specific, and important
- If you don’t know exactly what the question is, how can you answer it?

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Questions about Research Questions?

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Purpose of Practice-Based Research

- *To understand the way things work*
  - At population/practice level
  - Make inferences about biology and individual patients
  - Relationship between exposure and outcome
- Improve outcomes for patients
- Facilitate institutional change

Good or Bad?

- Should abortion be legal?

- Is it right to have capital punishment?

Why?

Not empirically testable, non-scientific

Good or Bad?

- Treatment of alcohol and drug abuse

- Sexuality and aging

Why?

General topics, not research questions

Questions should end with a question-mark!!!

Good or Bad?

- Diabetes mellitus and cardiovascular disease

- Cigarette smoking and lung cancer

Why?

Sets of variables, not questions

Good or Bad?

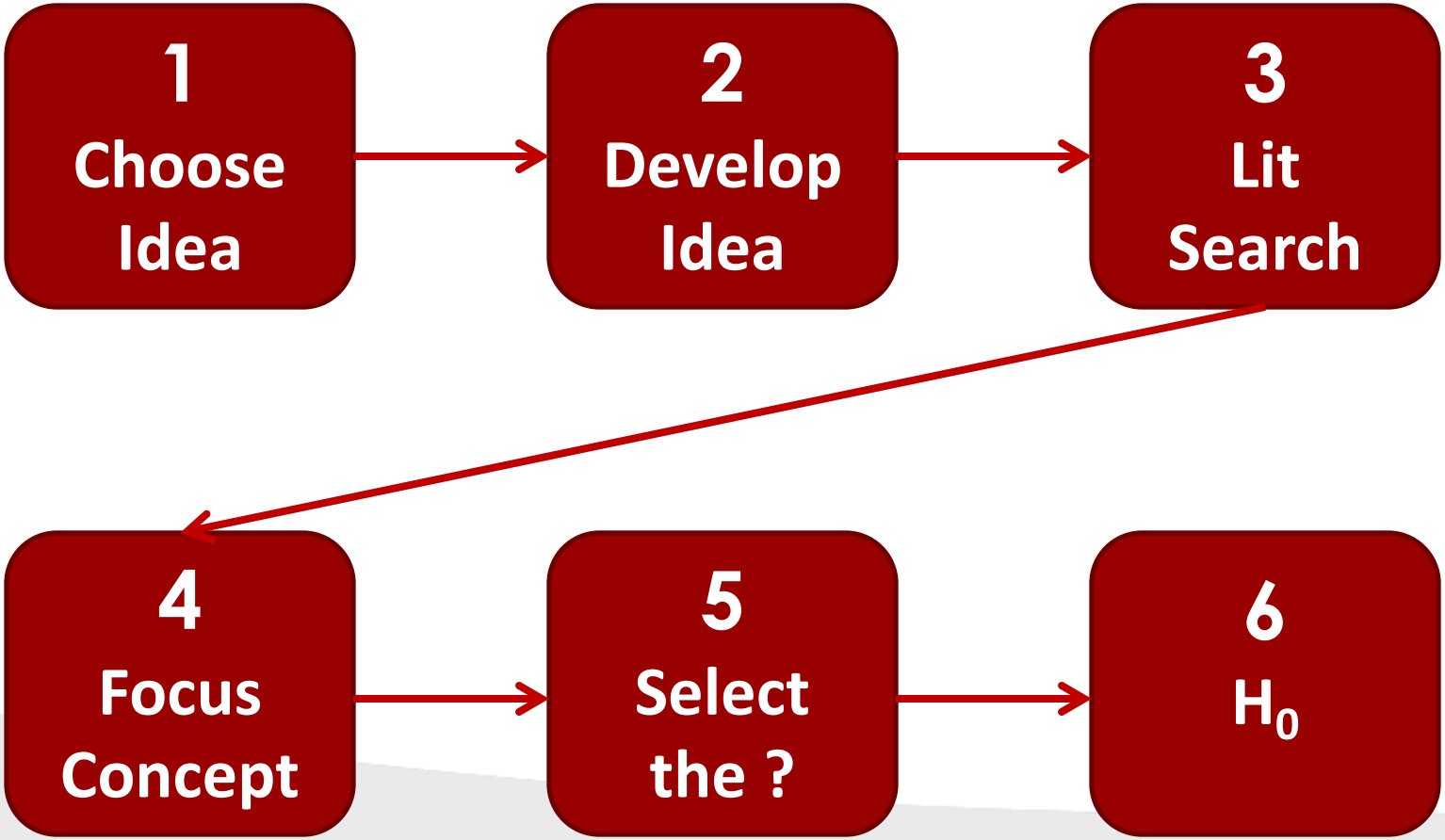
- Has stroke increased?

- How does poverty affect children?

Why?

Not specific enough

Good Questions

- Has the incidence of stroke in Wisconsin changed in the past 10 years?
- Is cardiovascular disease more common in patients that have been diagnosed with diabetes mellitus in the past?
- Is a lack of sufficient funds for preventive treatment a major cause of more serious medical problems among children raised in families in poverty?

Planning Research