

## 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

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



### Impactful Research

Dissemination

Appropriate analysis

Sound study design

**Good research question** 



## Consequences of III-Defined Research Questions

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





## Just one personal example



Picture it...

SHEA, 2008

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



## Purpose of Practice-Based Research

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



## Finding a Research Question

1. Area of personal interest

2. Area of institutional (or funder) interest

3. Impact (ARI vs. Leprosy)

4. Feasibility



# 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



### Where else to look for ideas

- Gaps in clinical practice
- Gaps in processes
- Need for quality improvement
- Literature
- Guidelines from professional societies
- Research focus areas from funding agencies (NIH/AHRQ/CDC)



#### 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



## Examples

## Should antimicrobial stewards be allowed to overrule physician judgment?

Answer depends on individual attitudes and beliefs



## Examples

<u>Question</u>: 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?

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## Scalability

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





## Sustainability

## Can the program run without additional resources?









## Scenario for your consideration

## Hospital outbreak of CDI, which stewardship intervention to deploy?







## 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?



## Questions about Research Questions?

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#### Should abortion be legal?

#### Is it right to have capital punishment?

## Why?

Not empirically testable, non-scientific



Treatment of alcohol and drug abuse

Sexuality and aging

Why?

General topics, not research questions

**Questions should end with a question-mark!!!** 



Diabetes mellitus and cardiovascular disease

Cigarette smoking and lung cancer

*Why? Sets of variables, not questions* 



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

