

# An Overview of Your Research Project: Start the New Year with A Research-Ready Proposal!

Mark R. Speicher, PhD, MHA

SENIOR VICE PRESIDENT FOR MEDICAL EDUCATION AND RESEARCH  
AMERICAN ASSOCIATION OF COLLEGES OF OSTEOPATHIC  
MEDICINE

# Conflicts:

Dr. Speicher has no conflicts of interest to declare.

# Contacting Me

[mspeicher@aacom.org](mailto:mspeicher@aacom.org)

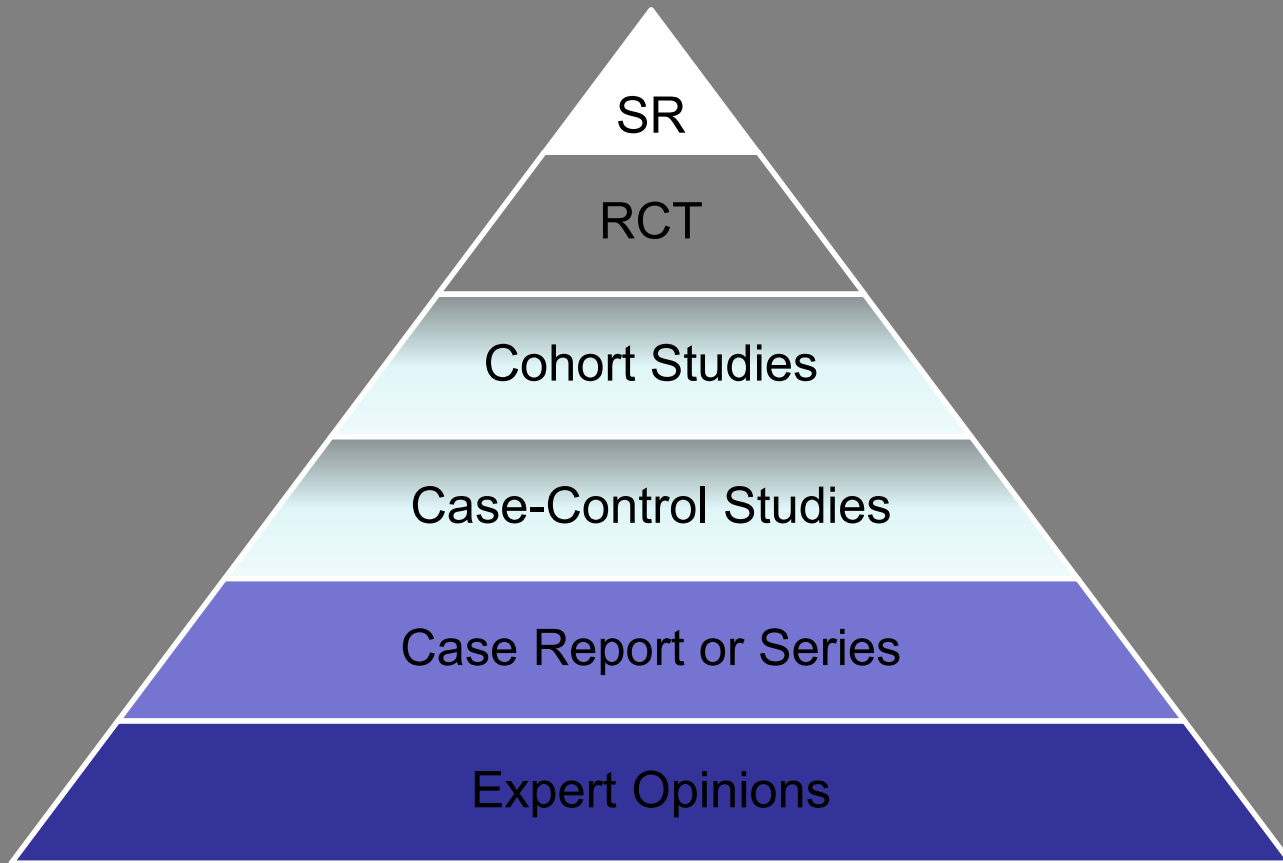
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# Objectives

1. Developing research opportunities and research questions
2. Finding research mentors (interactive exercise)
3. Developing proposals for IRB approval, Conference session or abstract submission, and Funding
4. How to decide on a data analysis plan for non-statisticians

# ...An Unfamiliar Process



# The Steps of Developing Research Are Things We Regularly Do...

**Ideate.** Topics ripe for new investigations or analysis are everywhere.

**Plan.** Consider how your project can fill the existing gap. If you are new to scholarly pursuits, seek the help of a mentor.

**Gather.** Collect your data and follow your protocol. If you are writing a review or other analysis, allow your findings to drive the paper.

**Disseminate.** Writing the paper first also allows you to identify and address weaknesses early on.

**Submit.** Identify the journal you will be submitting to and follow the author guidelines.

Source: Orenstein R. From patient to paper: How to become involved in scholarly activity. The DO, November 3, 2015. Accessed 11/23/2015 from <http://thedo.osteopathic.org/2015/11/from-patient-to-paper-how-to-become-involved-in-scholarly-activity/>

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# Your COM Provides Resources and So Does AACOM - We Want You to Be Successful!

Office of Research and Sponsored Programs (Including IRB)

University Libraries

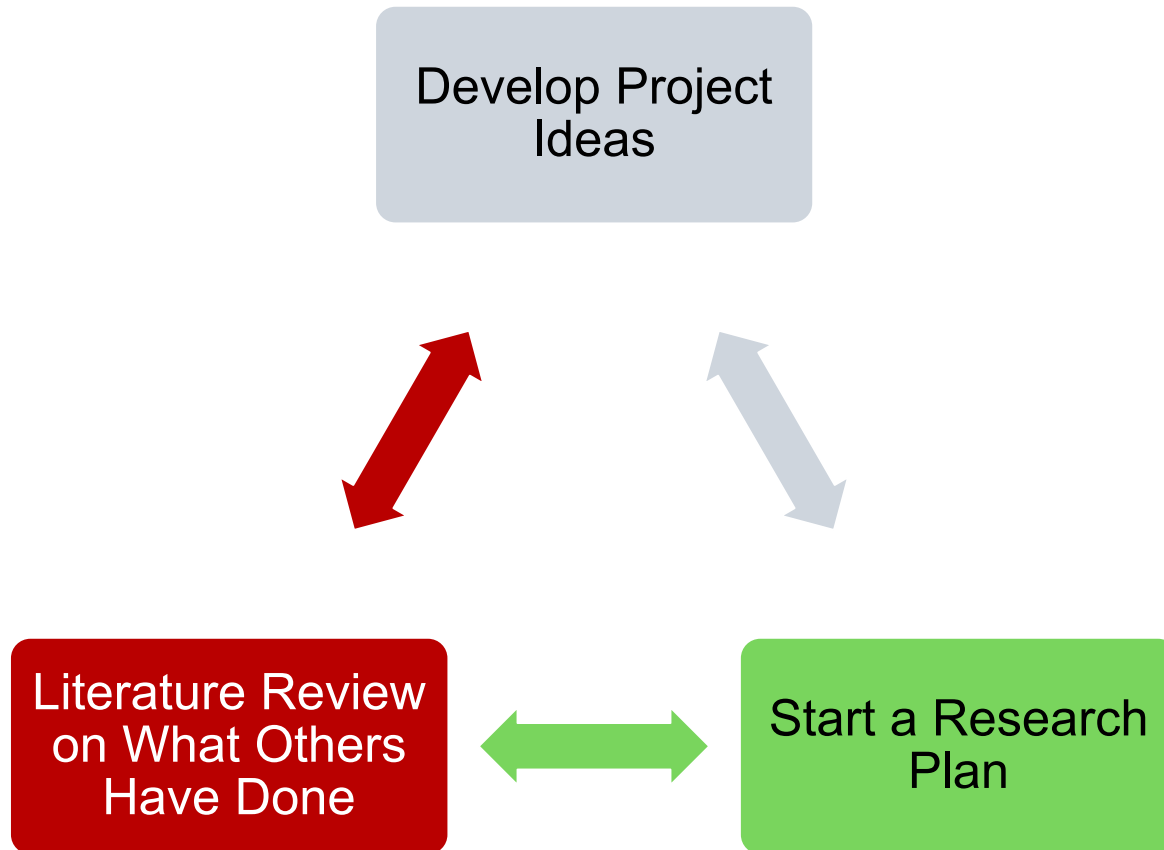
Non-COM Faculty Expertise

COM Resources and Faculty Expertise

Hospital Help and Expertise

You!

# Where Do We Go From Here?





## Research Methods Quick Reference Guide

Mark Speicher, PhD, Senior Vice President for Medical Education and Research (mspeicher@aacom.org)

### 1 Research Question

This section of the guide reviews how to develop your research question. Remember, your research question and its associated hypotheses determine the importance of your project, the data you will need, and the analytic methods you will use.

**Your program or intervention** What kinds of things do you want to know about your patients and how to care for them? Do you want to try a new treatment? How can you improve the care you provide? Do you want to better understand a diagnosis or disorder? Do you want to learn more about the epidemiology of the diseases they see? These improvements lend themselves to research.

**Good research questions have the following characteristics:** They are clear, they are interesting, they are important, and they are answerable..

**Note:** You will write several drafts of your research questions as you refine them through the review of the literature, and in discussion with colleagues

<p>✓ Write your research goals</p>	<p><b>Write 2 or 3 goals you want to achieve</b> For example, a goal might be, “To determine which educational interventions most increase the engagement of my residents.” Or, “What are the characteristics of students that are dissatisfied with this rotation?”</p>
<p>✓ Develop and refine your research question</p>	<p><b>Components of your research question include:</b></p> <ul style="list-style-type: none"> <li>• Your program or intervention</li> <li>• Target group</li> <li>• Outcome you want to achieve with your project</li> <li>• (compared to what or to whom)</li> </ul> <p>The following exercise might help. Try to frame your research question like this: “Does a ___ for ___ result in ___?” For example, Does a video educational program for elderly patients with CHF improve treatment compliance compared to written information?</p>
<p>✓ This process is not stepwise...</p>	<p>Seeing how similar research has been performed (in the Lit Review) will help you revise and refine your research question. Likewise, thinking about how you will collect or analyze your data will also help you refine your question.</p>

# Step 1. Ideas for Research Questions

Think about what you do

- “Why do we do this?”
- “Why don’t we do that?”
- “Upon what evidence are we basing our approach?”

Ensure the answer matters to you and your colleagues

# Research Methods 101: Putting Your Question into the Larger Context of Research

See the handout!

Question

Methods

Data

Statistical Tests

Results

Meaning and Importance

## Step 2. Is the Question Novel? Interesting? Important?

If “there’s too much to read,” your question is too broad

If there’s already an answer, does the research apply to your patients? If yes, look in the Discussion section of the paper for “recommendations for further research”

Look for clues as to your methods, survey instruments, etc.

# Types of Research

## Qualitative

- Themes, commonalities, perceptions of reality
- Looks for similarities and differences in groups

## Quantitative

- Measures, statistical testing, p-values
- Looks for correlations, associations between variables

# Types of Research Questions

## Descriptive

- What are the characteristics of...

## Observational and Relational Questions

- Which is more common?
- If two diseases have the same ... do they have the same ...
- Is there a pattern to...

## Causal Questions

- What is the effect of... on ...
- How does ... affect ...
- What is the association between... and ...

## 2 Literature Review



**Review the research that exists on your topic** This section assists you in performing a literature review for your project. This section includes information on medical library resources. As faculty members, many of you have access to these resources. Many of these resources require a username and password. There are standard usernames and passwords for some external resources, but for most outside databases, you obtain them through the library website.

<p>✓ Begin searching for articles</p>	<p><b>Search for relevant articles</b> Use the phrases from your goals and research questions in Step 1 as keywords to begin searching for articles about your research topic. Use your COM or hospital library site to search databases and journals online (especially PubMed and eJournals).</p> <p>Use PubMed as your starting point, as most medical education journals are indexed in PubMed. Search for common terms, and once you find a relevant article, search by MeSH (Medical Subject Headings) terms.</p> <p>Search tips: Click on the title of the article and then click on the Publication Types, MeSH Terms link under the abstract. Additionally, the link to Clinical Queries is in the PubMed Tools column in the center bottom of the PubMed opening page. Clinical Queries is a PubMed interface that applies pre-set search filters to focus your search in three areas: Clinical Study Categories: Select a Category (Etiology, Diagnosis, Therapy, Prognosis, or Clinical prediction guide) and a Scope (Broad or Narrow) to filter your search results. Systematic Reviews: Filters the search to include systematic reviews, meta-analyses, and guidelines on your topic. Medical Genetics: Filters a disease search for articles about genetic diagnosis, clinical description, management, counseling, molecular genetics, and genetic testing.</p>
<p>✓ Identify helpful articles</p>	<p><b>Review the articles and assess their applicability</b> You will find articles that tell you what others who are interested in finding answers to similar teaching problems have done. There are several ways this can be helpful:</p> <ul style="list-style-type: none"> <li>• The articles show what research in areas of your interest look like, and serve as a guide for getting your own research published.</li> <li>• The articles might provide tools, like evaluation forms, that you can test in your own research.</li> <li>• The articles might give you suggestions for statistical methods or ways of answering your research questions.</li> </ul>
<p>✓ Create a bibliography</p>	<p><b>Track your citations</b> The easy way is to store citations in a word document, with notes on what you want to use from that citation. You can also keep electronic or paper copies of especially useful articles. Some medical libraries provide free access to citation managers. Otherwise, I suggest an Excel spreadsheet where you track authors, publication years, article titles, journal volumes, numbers and pages, and your notes on how the article contributes to your research project.</p>

# General Guidelines for Writing a Literature Review

It is important to cover research relevant to all the variables being studied.

Research that explains the relationship between these variables is a top priority.

You will need to plan how you will structure your literature review and write from this plan.



# Planning Your Literature Review

Topical Order—organize by main topics or issues; emphasize the relationship of the issues to the main “problem”

Chronological Order—organize the literature by the dates the research was published

Problem-Cause-Solution Order—Organize the review so that it moves from the problem to the solution

Source: J.Johnson, Department of Psychology, Sam Houston State University

# Organizing Your Literature Review

General-to-Specific Order—(Also called the funnel approach) Examine broad-based research first and then focus on specific studies that relate to the topic

Specific-to-General Order—Discuss specific research studies so conclusions can be drawn, support those larger conclusions with additional research, if available

Source: J.Johnson, Department of Psychology, Sam Houston State University

# Conducting a Systematic Review of the Literature

Choose search engines likely to include the work you are interested in (e.g. PubMed, Google Scholar, etc.)

Once you find one or more articles that are pertinent, check the MeSH terms, and the citing articles, as well as the citations in that article

Annotate what you find as you go, and document the number of articles your search returns

Title review, abstract review, full review

# Writing the Literature Review

After reviewing the literature, summarize what has been done, what has not been done, and what needs to be done

Remember you are arguing your point of why your study is important!

Then pose a formal research question or state a hypothesis—be sure this is clearly linked to your literature review

Source: J. Johnson, Department of Psychology, Sam Houston State University

# Citations

All sources cited in the literature review should be listed in the references

Only those sources cited in the article review should be listed in the references

Source: J.Johnson, Department of Psychology, Sam Houston State University

# Keep the Purpose in Mind

A literature review should include introduction, summary and critique of journal articles, justifications for your research project and the hypothesis for your research project

Source: J.Johnson, Department of Psychology, Sam Houston State University

# Common Errors Made in Lit Reviews

Review isn't logically organized

Review isn't focused on most important facets of the study

Review doesn't relate literature to the study

Too few references or outdated references cited

Review isn't written in author's own words

Review reads like a series of disjointed summaries

Review doesn't argue a point

Recent references are omitted

# Checklist for the Literature Review: Things The Researcher Should Know

A literature review forms the basis for high-quality medical education research and helps maximize relevance, originality, generalizability, and impact.

Literature reviews tell the story of what we know and what we don't

A literature review provides context, informs methodology, maximizes innovation, avoids duplicative research, and ensures that professional standards are met.

Literature reviews take time, are iterative, and should continue throughout the research process.

Student researchers should maximize the use of human resources (librarians, colleagues), search tools (databases/search engines), and existing literature (related articles).

Keeping organized is critical.

Adapted from Lauren A. Maggio, Justin L. Sewell, and Anthony R. Artino Jr (2016) The Literature Review: A Foundation for High-Quality Medical Education Research. *Journal of Graduate Medical Education*: July 2016, Vol. 8, No. 3, pp. 297-303.



## 1b. Back to the Research Question...

Now develop some Testable Hypotheses

- Hypothesis is a question where you've taken a position

How will you measure exposure or intervention, outcome, other answers?

- What are the measurable variables that will help you test your construct? Be the devil's advocate – these are limitations to your study.
- How well will you believe your measurements – this is the reliability and validity

This leads to your research protocol

<div data-bbox="137 365 745 482" style="background-color: #2c5e8c; color: white; padding: 10px; border-radius: 15px; display: inline-block;"> <h2 style="margin: 0;">3 Research Method - Data</h2> </div>	<p><b>What kind of data can I use?</b> Generally speaking, data can be qualitative or quantitative. Qualitative data comes from interviews, observations of interpersonal interaction, and other observations and analyses of communication or verbal or non-verbal interactions. Quantitative data can be numerical and can be representations of preferences (like Likert-scale scores ranging from disagree to agree), relative quality (like best or worst), or scores (like grades and test scores).</p> <p><b>Using existing data</b> Hospitals and residency programs already gather lots of data on patients, students, and residents. Using this data usually involves a data agreement, IRB approval of your research project, and an approval of the Dean or Hospital CEO.</p> <p><b>Collecting novel data</b> You may wish you analyze data that does not yet exist. You can do this by collecting the data already in your EHRs, or collecting observations, interviews, checklists for tasks or components of understandings, surveys, and other kinds of data collection tools.</p> <p>There are lots of ways to create data collection tools. But a tool that collects some or all of the data you want to collect may already exist. You should assess the relevant literature, and look for standardized tests that measure your construct of interest, before inventing your own instrument. Designing your own instrument adds time to the process, because your instrument will need to be refined and validated. Talk to your colleagues, or to Mark Speicher (<a href="mailto:mspeicher@aacom.org">mspeicher@aacom.org</a>) for tips on designing your own data collection instrument.</p>
<p>✓ Prepare your project for IRB Review</p>	<p><b>File for IRB Review</b> The Institutional Review Board must review all research projects that involve human subjects, which includes all research on students. Generally, your IRB (either through a COM or a hospital) will have a staff person that can help you with the forms, and a web site that has form and instructions.</p>
<p>✓ Complete your training in Human Subjects Research, usually on the web!</p>	<p><b>Training in Human Subjects Protection</b> Most COMs require that all Investigators and study personnel involved with the project provide proof of completion of three CITI training modules: (1) Belmont Report and CITI Course Introduction, (2) Basics of Health Privacy, and (3) Information Security. The CITI Human Subjects Research (HSR) series consists of basic and refresher modules from two tracks, Biomedical and Social-Behavioral-Educational, and a set of Additional Modules of Interest. Once you establish an account and indicate the type of research that you do, your dashboard will automatically populate with the three required modules and optional modules from either track. Of the number of training modules offered for Human Subject's Training, you must generally complete at least (1) <i>Belmont Report and CITI Course Introduction</i>, (2) <i>Basics of Health Privacy</i>, and (3) <i>Information Security</i>.</p>

# Step 3. Develop a Plan to Answer the Question

What kind of data are you collecting?

How will you collect it?

What is your design?

What statistical tests will you use?

What have other studies done?

# And Remember...

- Easier is better
- The wrong method is fatal
- The right method makes things easy
- Good reference: Users' Guide to the Medical Literature: A Manual for Evidence-Based Clinical Practice

<h2 style="background-color: #2c5e8c; color: white; padding: 10px; border-radius: 15px; display: inline-block;">4 Research Method - Analysis</h2>		<p><b>Think about the about data analysis in every step</b> The data analysis is the way you intend to answer your research question, so you need to think about the analysis in every step of the process. Usually, the analysis of qualitative data concentrates on the discovery of repeated themes and finding different sources of information that confirm the same information (called “triangulation”).</p> <p><b>Statistics</b> The analysis of quantitative data usually includes information about the distribution of the data, using descriptive statistics (like a measure of central tendency (the mean, median, mode), a measure of variation (standard deviation or variance) and the frequency of individual responses. Often, research questions are further analyzed by the application of statistical hypothesis testing.</p>
<p>✓ Choosing a statistical test</p>	<p>Your research question and your data will help you choose the proper statistical test. The three main kinds of statistical testing are:</p> <ul style="list-style-type: none"> <li>• Descriptive statistics that tell about an individual or group and how it might be different than other individuals or groups</li> <li>• t-tests and other comparison of means tests let you know if the difference between two groups (or a before-and-after group) is likely due to chance, or due to an actual effect</li> <li>• Chi-square and other tests of normality let you know if your group has the same distribution (for example, of grades) to a hypothetical group</li> <li>• Regression and other predictive tests let you know if your intervention had a significant effect on some outcome variable (e.g., did the use of my study guide improve scores on the in-service examination?)</li> </ul>	
<p>✓ Performing statistical tests</p>	<p>The University provides SPSS as a statistical package on campus, and Excel can be used to run a number of statistical tests. For in help in running your statistics, contact Mark Speicher (<a href="mailto:mspeicher@aacom.org">mspeicher@aacom.org</a>).</p>	
<h2 style="background-color: #2c5e8c; color: white; padding: 10px; border-radius: 15px; display: inline-block;">5 Conclusions</h2>		<p>The conclusions section is your opportunity to reflect on your research. Was the result important? Was it what you expected? What were the difficulties in the research? How well did you answer your research questions?</p> <p>This is your chance to think about how your research findings can be used by you, and by others, to teach medical students and residents more effectively.</p>
<p>✓ Limitations</p>	<p>Every research study has limitations. A limitation is an obstacle to generalizability – something that keeps your research from being true in all situations or with all students. These limitations might include a small number of participants, concerns about whether the data really measure what you are trying to measure, or threats to validity in the research design. You should try and reduce the limitations in your study by designing your research to be reliable (that it is repeatable with other groups) and valid (that it shows what you say it does.) You should also review what the limitations mean for your conclusions.</p>	

# After Your Research

Submit a report to the IRB

Close out your patient data collection (e.g. confidentially destroy any data you no longer need)

Implement findings in your practice

Congratulate yourself!

Come up with your next question...

## Making the Most of Mentors

- Getting ready
- Finding a mentor...or two
- Things to look for in a mentor
- The first meeting
- Cultivating the mentor-mentee relationship
- Separation

Source: Zerzan et al. Making the Most of Mentors: A Guide for Mentees. Academic Medicine 84(1) 140-144. 2009.

# Getting Involved in Research

## Existing Projects

- Cold calls
- Mentors
- Applying for research opportunities

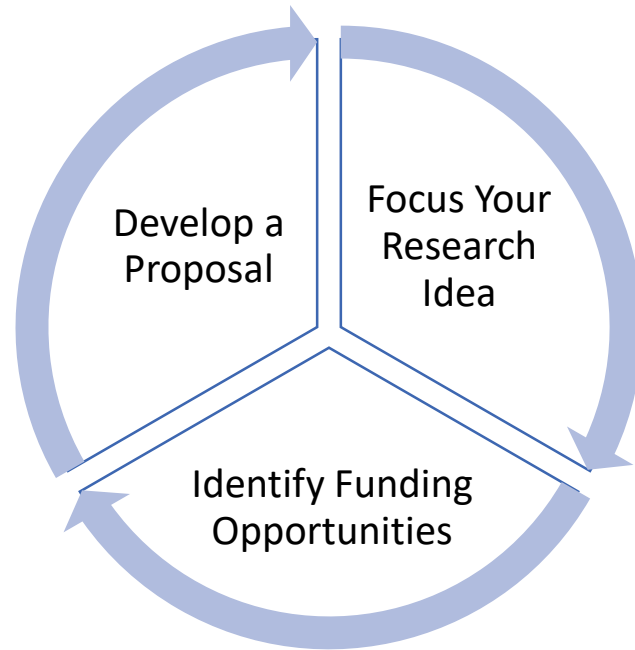
## Existing Data

- Hospital Data
- US Government Data
- AACOM Data



# Developing Your Proposal

# Embrace the Cycle



Adapted from Kanji S. Turning Your Research Idea into a Proposal Worth Funding. *Journal of the Canadian Society of Hospital Pharmacists*. 68(6): November-December 2015.

# Focus Your Research Idea

## Current Evidence on Your Question

- What do we know, and what do we need to know
- Who is writing, publishing and funding in this area (authors are required to disclose funding sources)
- Become very familiar with the literature

## Honest Introspection

## Clarify the Research Question

- Do what we teach: PICO questions
  - Problem, Intervention, Comparison, Outcomes (and sometimes Time)
- See what kinds of clarifying framework are used in the literature

# Focus Your Research Idea (continued)

## Assess your expertise and resources

- What knowledge, skills and resources are necessary to answer the question?
- Do you have/can you get them?

## Identify potential research team members

## Develop a synopsis of your study

- One-to-two-pages
- Organization: Team members, Research Question, Background/Rationale, Study Objectives (including study endpoints and hypotheses to be tested), Methods (including data sources), Impact
- Address logistic and feasibility questions, including power (so you know how many subjects you need)

STOP



Have others read your proposal critically



Ask them to allow you to explain your proposal and answer questions



Do this with several people

# Identify Funding Opportunities

- Identify different types of funders
  - Government funders (grants.gov)
  - Private foundations
  - Professional and membership organizations (including AACOM and AOA)
  - Internal funding sources
  - Corporations or NGOs

## Identify Funding Opportunities (continued)

### Align your objectives with those of the granting agency

- Calls for submissions
- Previous grants
- Mission statements
- Eligibility criteria

### Contact the organization

- Discuss your ideas
- Get advice on the application process
- Gauge enthusiasm of the funder
- Ask how to frame the project to highlight the alignment of the proposal with the agency's interests

# Write the Research Proposal

## Review the guidance for applicants

- Details what is required at each stage
  - Eligibility requirements
  - Outline expectations of grantees
  - Logistical requirements – CVs, biosketches, signatures, letters of support
    - These will help you establish a timeframe
  - Requirements of your institution
    - Office of funded programs or extramural funding

## Letter of Intent?

## What additional background information is needed

- Do you need to audit the current state of the problem?
- Scope the proposal based on the submission guidelines (e.g. grant length)



# Write the Research Proposal (continued)

- Prepare the Budget
  - Be honest
  - Be practical
- Budget Line items:
  - Personnel
  - Equipment
  - Services (include actual quotes)
  - Supplies
  - Travel
  - Institutional overhead
- Create an annotated timeline

# Draft a Data Analysis Plan

## Identify Your Hypotheses

- What are the study endpoints?
- What are you testing?

## Identify Your Variables

- Continuous vs. Categorical
- How are you measuring them?

## Identify Your Plan

- Comparing means
  - Independent groups
  - Before/after change
  - Likelihood studies
- Sensitivity/specificity
- Prediction studies
  - Regression analysis

# Wrap-up: Key Considerations

- Research Question
  - Clear, validated, worthwhile
- Project Summary
  - Clear, concise, complete identification of need for the work
  - Alignment of objectives and funder goal
- Research Methods
  - Feasible and answers the question
- Infrastructure
  - All required resources are available (time, institutional oversight, etc.)
- Preliminary Work Conducted
  - Evidence supporting feasibility
  - Confirming subjects and endpoints
  - Testing study tools
- Support of Stakeholders
  - Letters of support
- Study Budget
  - Realistic and complete
- Dissemination Plan
  - Innovative and engaging
- Applicant and Team
  - Appropriateness of expertise, experience, and roles