The Research Question Part IV: Elements of a Good Research Question

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October 2014

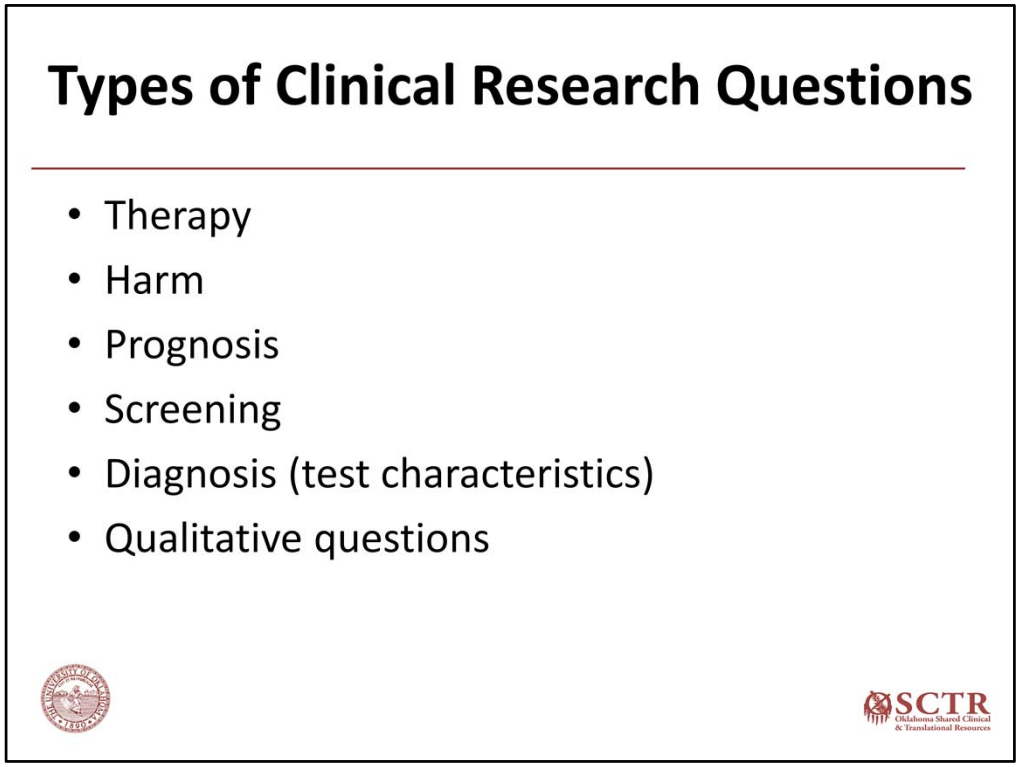
- Translating Practice Into Research (TPIR)
- Funded by NIH-NGMS

Welcome to the fourth and final part of the research question module. This part is titled elements of a good research question. I will remind you once again to please refrain from distributing or copying this video lecture.

Outline

- Types of Clinical Research Questions
- PICOT
- Qualitative Questions
- Reporting

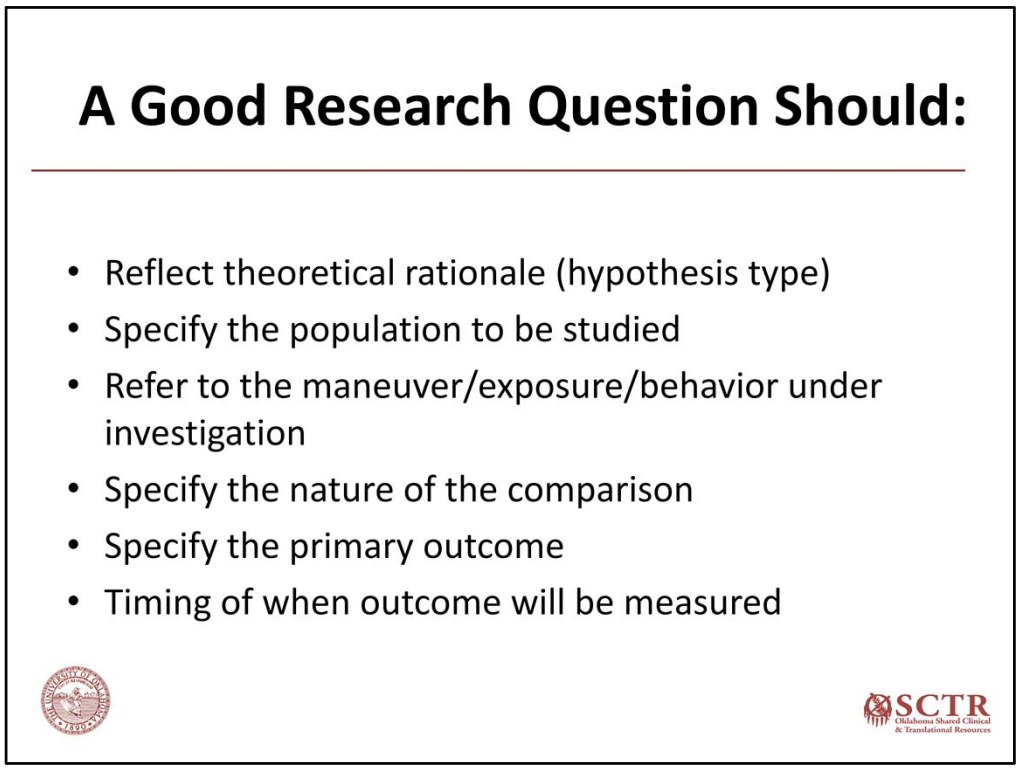
In this part we will be discussing types of clinical research questions, the PICOT question framework, qualitative questions, and reporting of results.



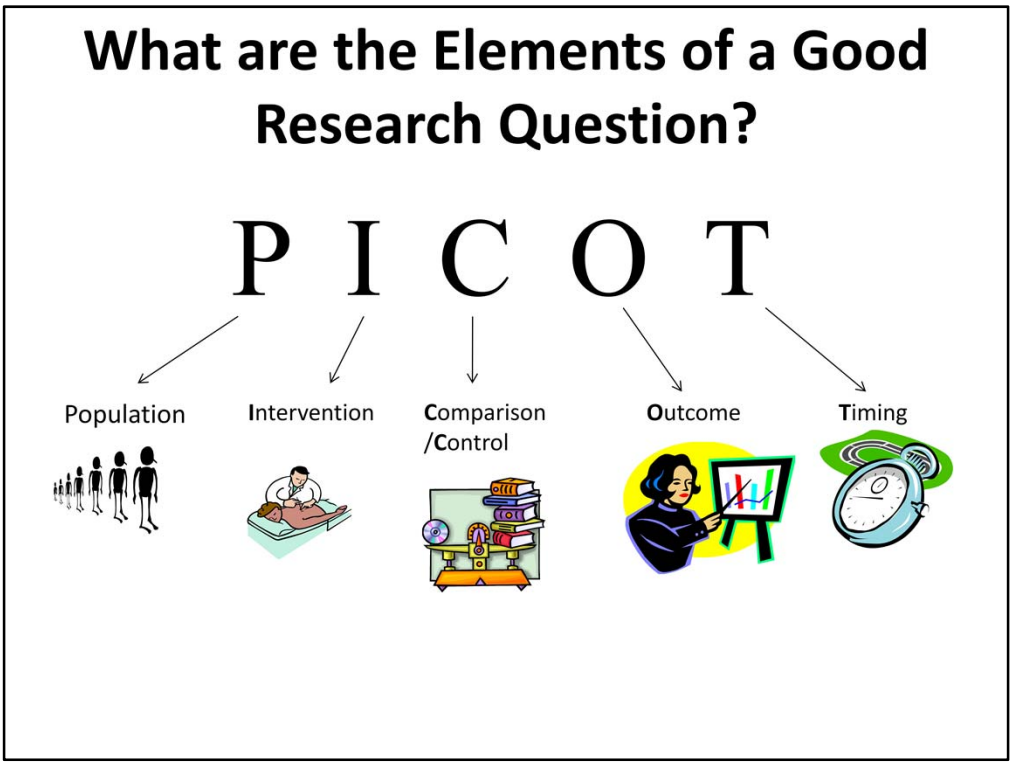
In part three of this module we discussed different types of hypotheses. There are also different types of clinical research question. You may ask questions about therapy, harm, or prognosis. For example does a new therapy increase the long term survival as compared to the current therapy. You may also have a clinical research question about screening, does digital mammography identify breast tumors better than screen mammography? You may have a question about diagnosis or test characteristics. For example you can compare different diagnostic modalities with accuracy of diagnosis as an outcome. You may also have qualitative questions that attempt to discover information about barriers or motivators.

What are the important elements of a good clinical research question?

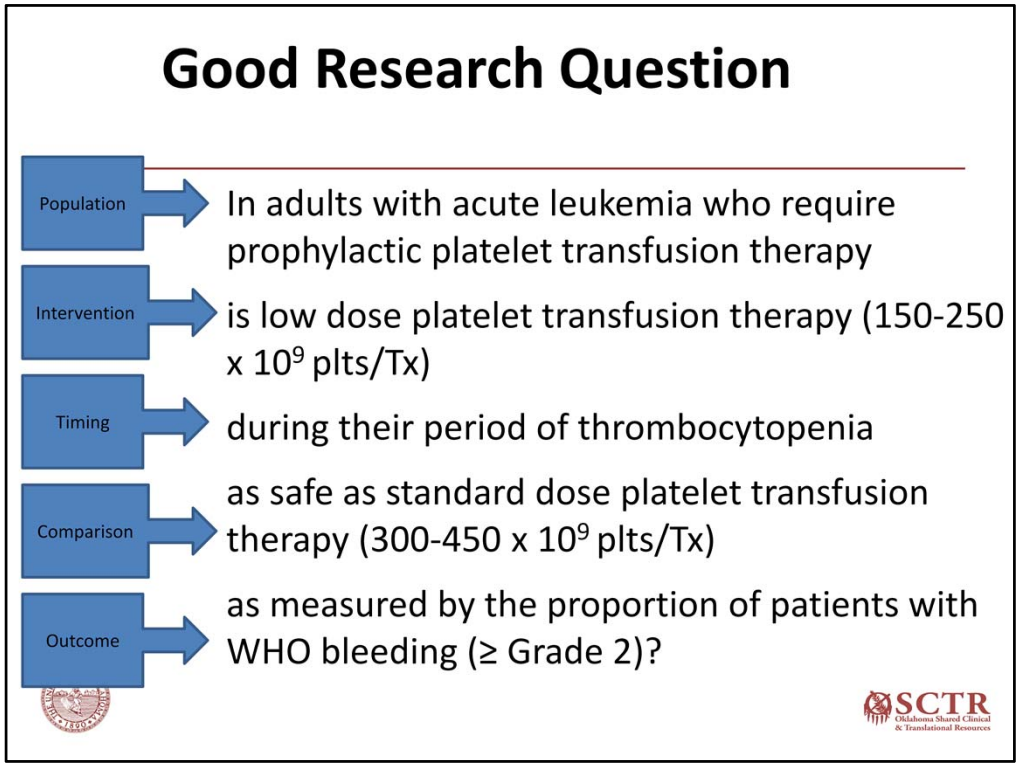
What are the important elements of a good research question? I stated the research question is the foundation of your project and the most important part of your study? So what makes a good research question?



A good research question should reflect the theoretical rationale. What is the hypothesis type (superiority, noninferiority, equivalence). The question should also specify the population to be studied, refer to the exposure under investigation, specify the nature of the comparison, specify the primary outcome, and specify the timing of the measurement of the outcome.



Once equipoise is established, it is time to develop a good research question, and the Acronym that can guide this process is PICOT. A good research question should clearly state all the elements of PICOT, the population, the intervention, the comparison or control group, the outcome and the timing of outcome measurement. Sometimes you will see it referred to as PICO without the T. The T for timing was added later and some still refer to it as the PICO format. Ideally the research question should be clearly stated at the end of the manuscript's introduction as this gives the reader a clear understanding of the study design. A PICOT formatted question is of even greater benefit to the researcher. Framing the research question in this format forces the researcher to think about all aspects of the study, and once this is done, specifics of the study design fall easily into place.



Here's an example of a good research question. In adults with acute leukemia who require prophylactic platelet transfusion therapy is low dose platelet transfusion therapy during their period of thrombocytopenia as save as standard dose platelet transfusion therapy as measured by the proportion of patients with grade 2 or greater bleeding? We can identify each parts of the question of interest. The population is adults with acute leukemia who require prophylactic platelet transfusion. The intervention is low dose platelet therapy between 150 to 250 million platelets per transfusion. The comparison group is standard dose platelet therapy between 300 to 450 million platelets per transfusion. The outcome is grade 2 or greater bleeding as defined by the WHO criteria. The timing is during their period of thrombocytopenia. Can you determine their hypothesis type? The investigators want to know if the low dose therapy is 'as safe as' the standard dose therapy. This indicates it is an equivalence trial. Non-inferiority would have been phrased as low dose platelet therapy is 'no less safe than' standard dose platelet therapy. Superiority would have been phrased low dose platelet therapy is safer than standard dose platelet therapy.

Why is a PICOT Formatted Question Important?

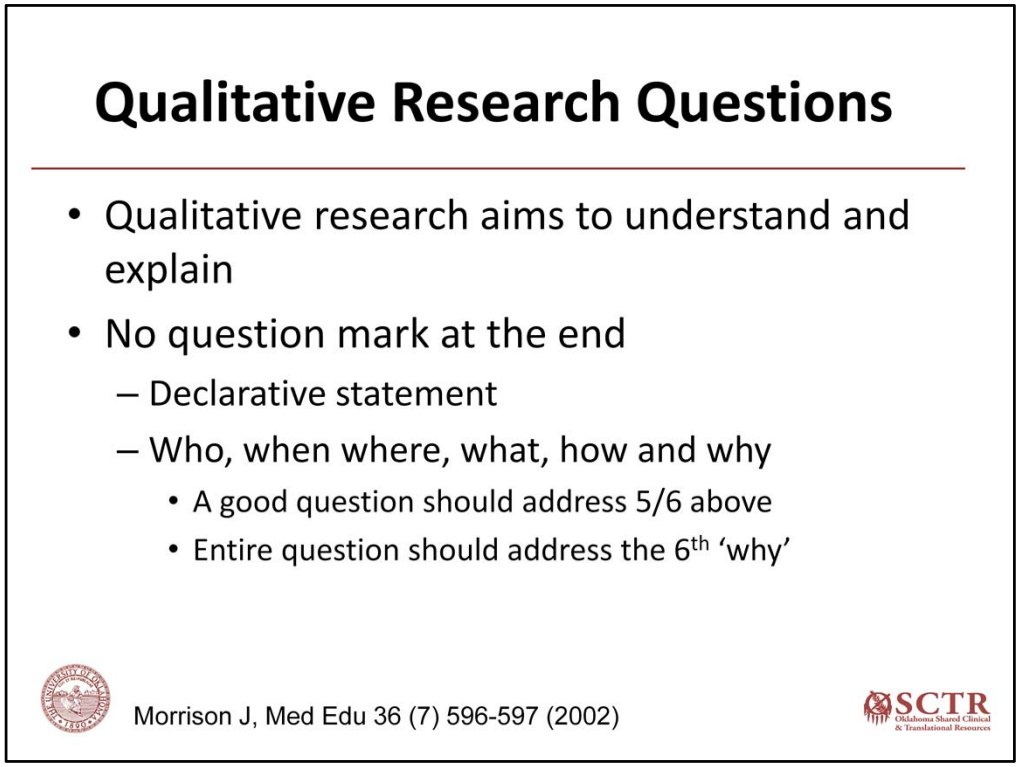
- Researcher

- Study design will *fall into place*
- Knowledge Translation

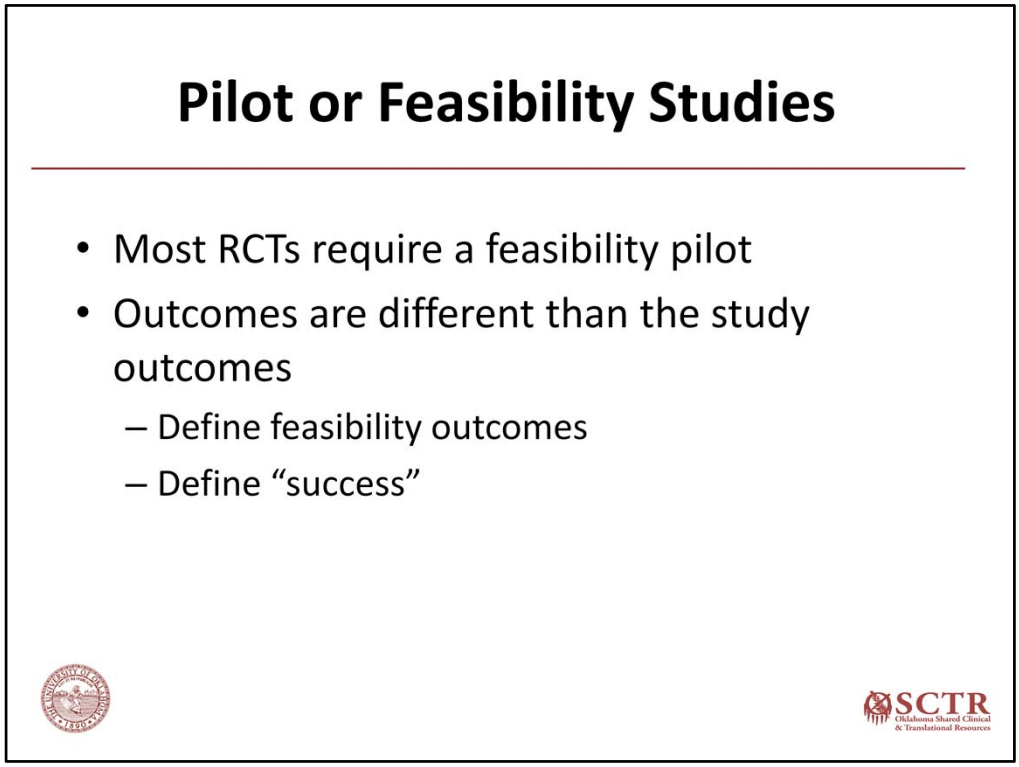
- Audience will clearly understand the study without having to hunt through the manuscript

State the question (PICOT format) at the end of the introduction when writing a manuscript

Why is the PICOT format question important? It is important for the researcher because once you establish the question in a PICOT format the study design will fall into place. It's important for knowledge translation because the audience will clearly understand the study without having to hunt through the manuscript. If the research question is not clearly stated it may be difficult for the reader to determine the conclusion of the study and its implications. It is a good idea to state the question in a PICOT format the end of introduction when writing a manuscript to clearly communicate the question.



What about qualitative research questions? Qualitative research aims to understand and explain. Often you will see these qualitative research question as declarative statements that end with a period instead of a question mark. These statements attempt to address who, when, where, what, how and why. A good question usually addresses five of the six above. The entire question should address the sixth which is the why. Examples of some qualitative research statements are: For patients with lupus, we are seeking to understand the barriers and motivators for smoking cessation; For patients with TTP, we are seeking to understand the barriers and motivators for receiving treatment for depression.



Another type of trial is a pilot or feasibility study. Most randomized clinical trials require a feasibility study before a large investment of resources and time is made by the investigators and by the funding agencies. Certain NIH institutes have specific funding mechanisms just for pilot or feasibility trials. In a pilot or feasibility study the outcomes are different than the study outcomes in your actual trial. Instead of an outcome of survival or response, these are feasibility outcomes and they will define the success of moving the feasibility project to a clinical trial. A feasibility outcome may include number of patients you are able to enroll over certain period of time or whether or not delivery of a certain intervention in a certain time period is possible in the majority of patients enroll. Many clinical trials that are designed, planned, and open fail to reach enrollment goals. A pilot trial can help investigators determine if completion is possible. After a pilot study you may determine the full trial is not possible or it is possible with modifications in your design.

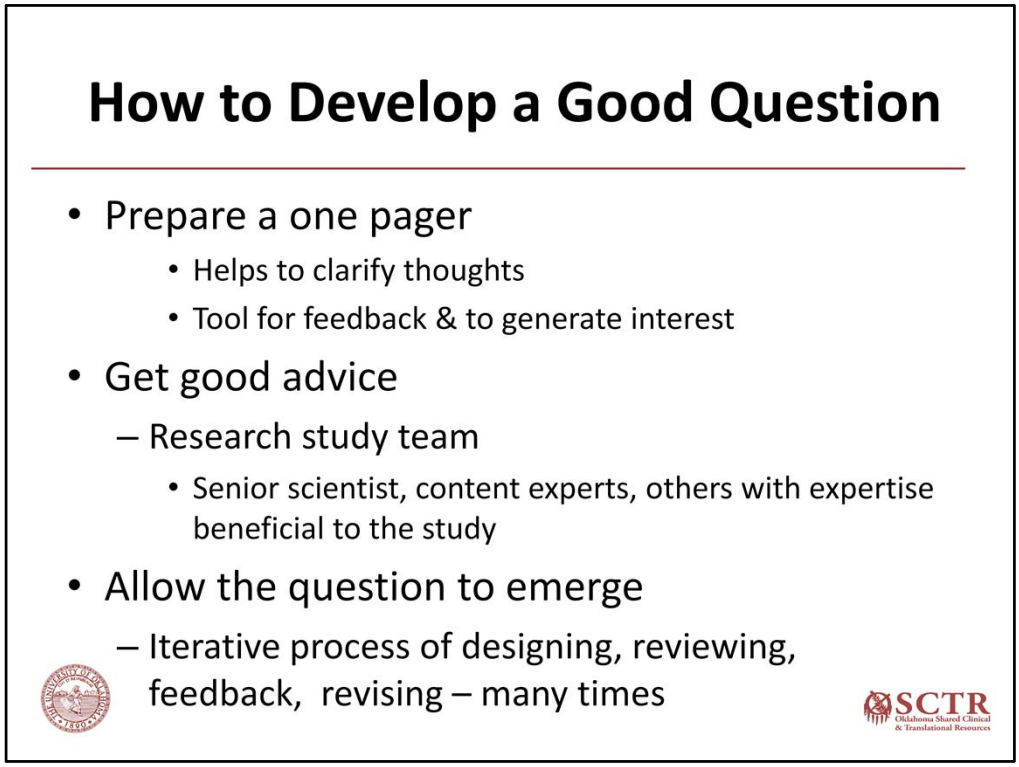
INFORM-Pilot

- Feasibility of a 25,000 patient study
- Stored blood and mortality
- Randomized patients to freshest vs oldest
- Outcomes

Feasibility Outcome	Criteria for success	Result
Can we recruit Tx patients and the full trial was than planned.	> 80% of eligible patients	84.7% 910 pts in 6 months
% of blood outdated	< 2%	<0.1%
Adequate difference in median age between treatment groups	11 days	13 days

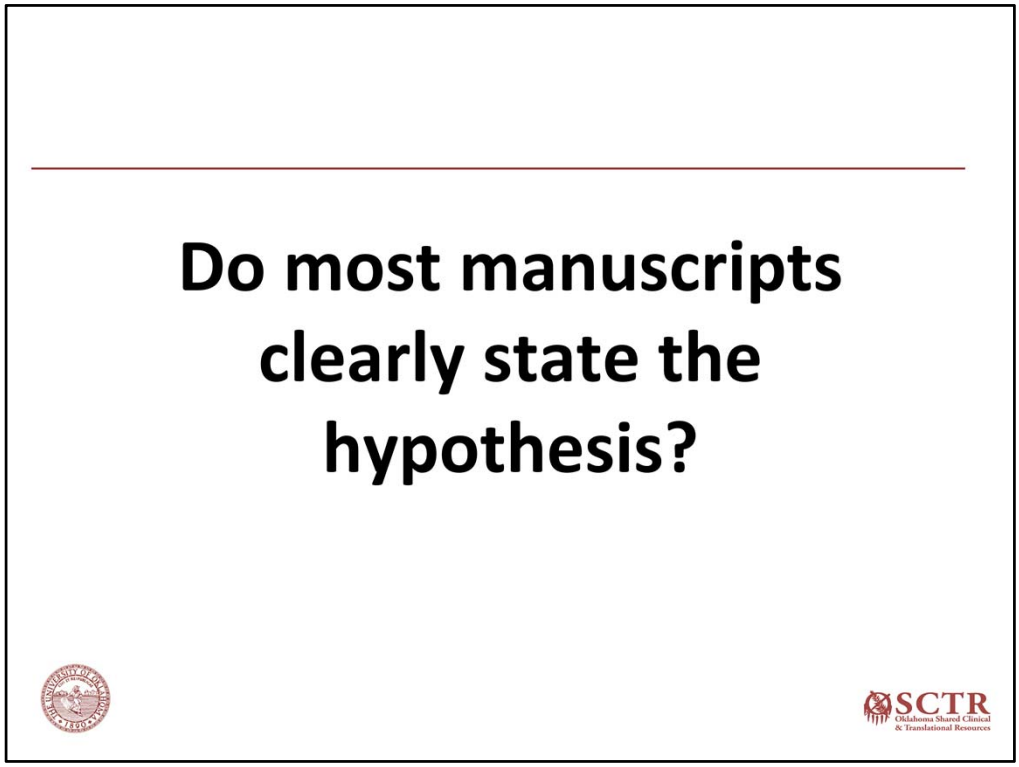
SCTR Oklahoma Shared Clinical & Translational Resources

Here's an example of a pilot study. The INFORM pilot study was a feasibility study for a trial that would need an enrollment of 25,000 patients. The study question for the full trial was about stored blood and mortality. The goal was to randomize patients to freshest versus oldest blood. The outcomes in the INFORM pilot study were feasibility outcomes. The first outcome was about recruiting transfusion patients. The criteria for success is at least 80% of eligible patients could be recruited. The result was that 84.7% or 910 patients in six months were recruited so this goal was met. Another feasibility outcome was the percent of blood that was outdated and had to be discarded. Criteria for success was that less than 2% of blood would have to be discarded. The result was less than .1% was discarded. Another feasibility outcome was adequate difference in median age between treatment groups. The blood in the fresh group and the whole group needed to be different. The criteria for success was at the mean difference between these two groups of blood was at least 11 days. Results showed that the mean difference was 13 days. All feasibility outcomes were met and the pilot study of 910 patients was able to help plan for the full scale study of 25,000 patients.

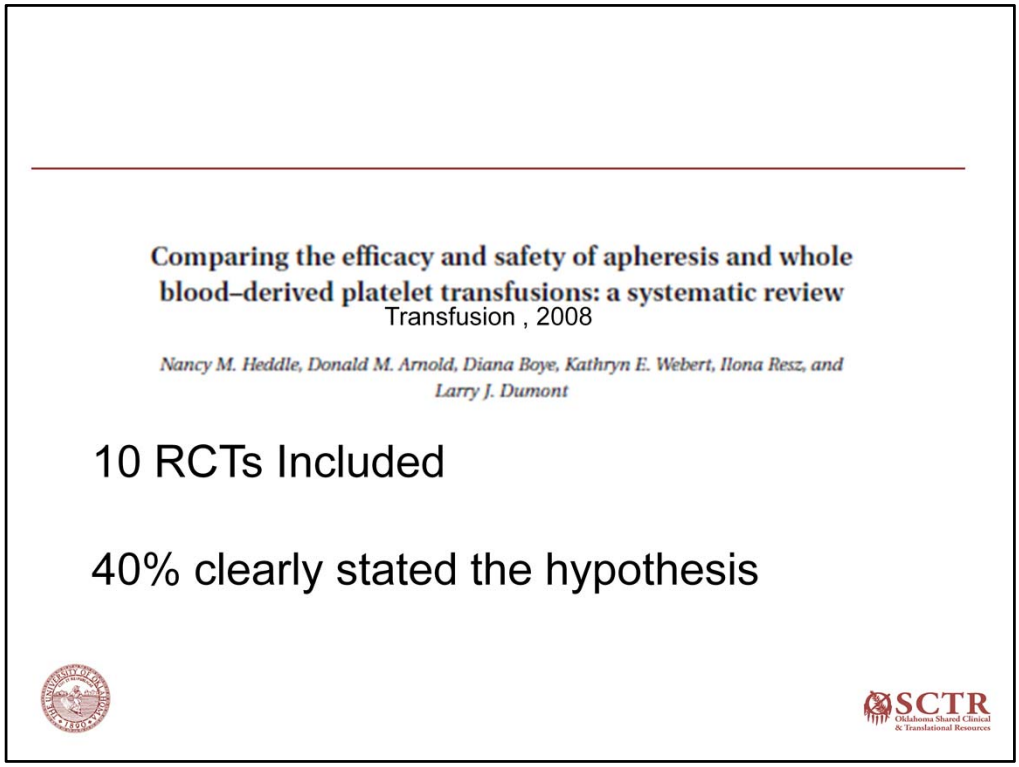


How do you develop a good question? Preparing a one pager helps you to clarify your thoughts and it is a great tool for feedback and to generate interest. Once you have this one pager then it is easier for you to get good advice. You solicit advice from your research study team such as senior scientists, content experts, others with expertise beneficial to the study as well as your mentors and colleagues. You need to allow the question to emerge. Creating a good research question is an iterative process of designing, reviewing, incorporating feedback and revising many, many times.

Make sure you put as much effort into reporting the question as you did designing it.

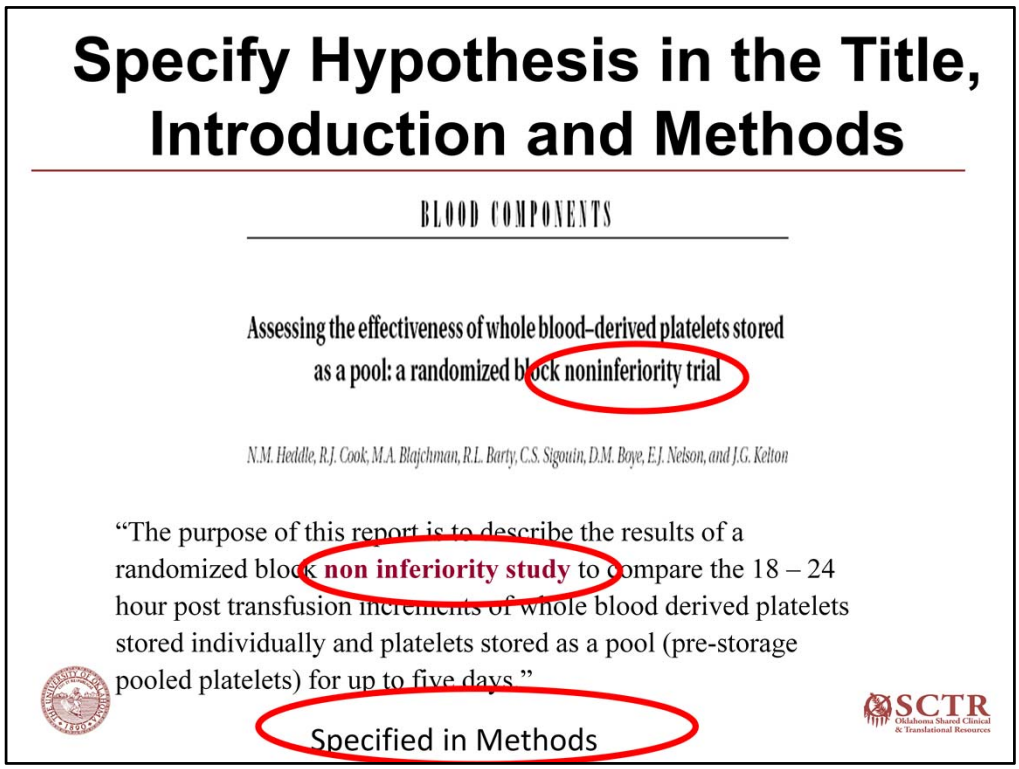


Do most manuscripts clearly state the hypothesis?



Here is an example of systematic review comparing the efficacy and safety of apheresis and whole-blood derived platelet transfusion. It included 10 RCTs, only 40% clearly stated the hypothesis.

Specify Hypothesis in the Title, Introduction and Methods

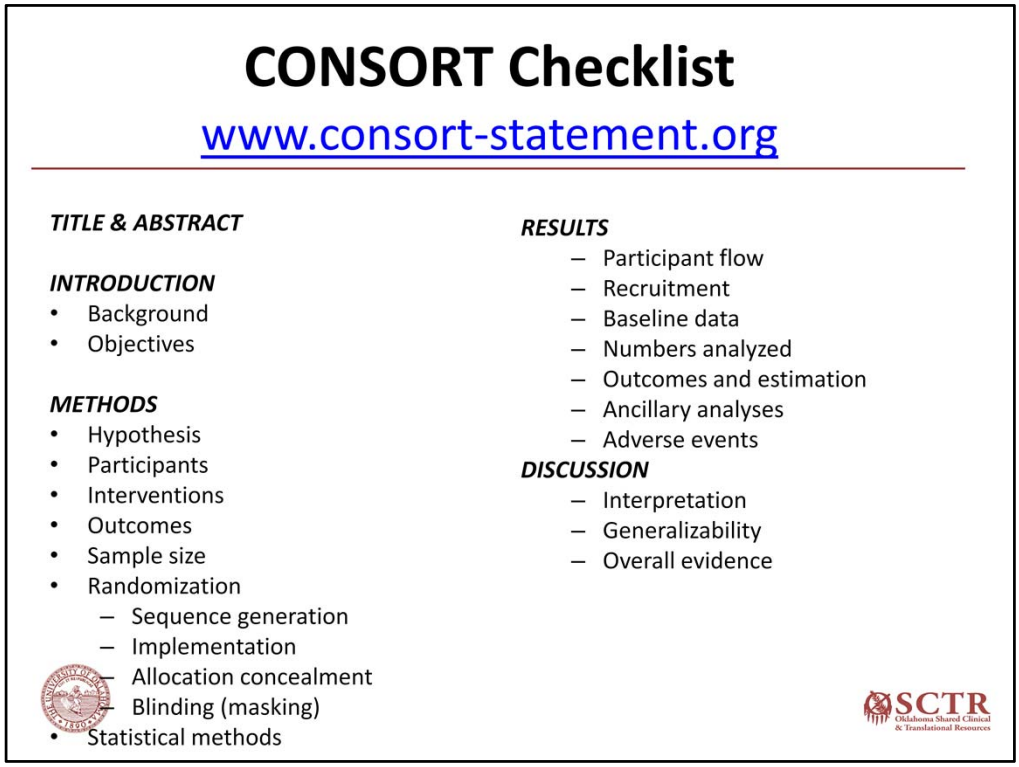


Make sure you specify your hypothesis in the title, introduction and methods sections. Here is a paper titled assessing the effectiveness of whole-blood derived platelets stored as a pool: a randomized block noniferiority trial. The title tells the reader the hypothesis is one of noninferiority. The purpose is stated and includes the hypothesis. It is also stated in the methods.

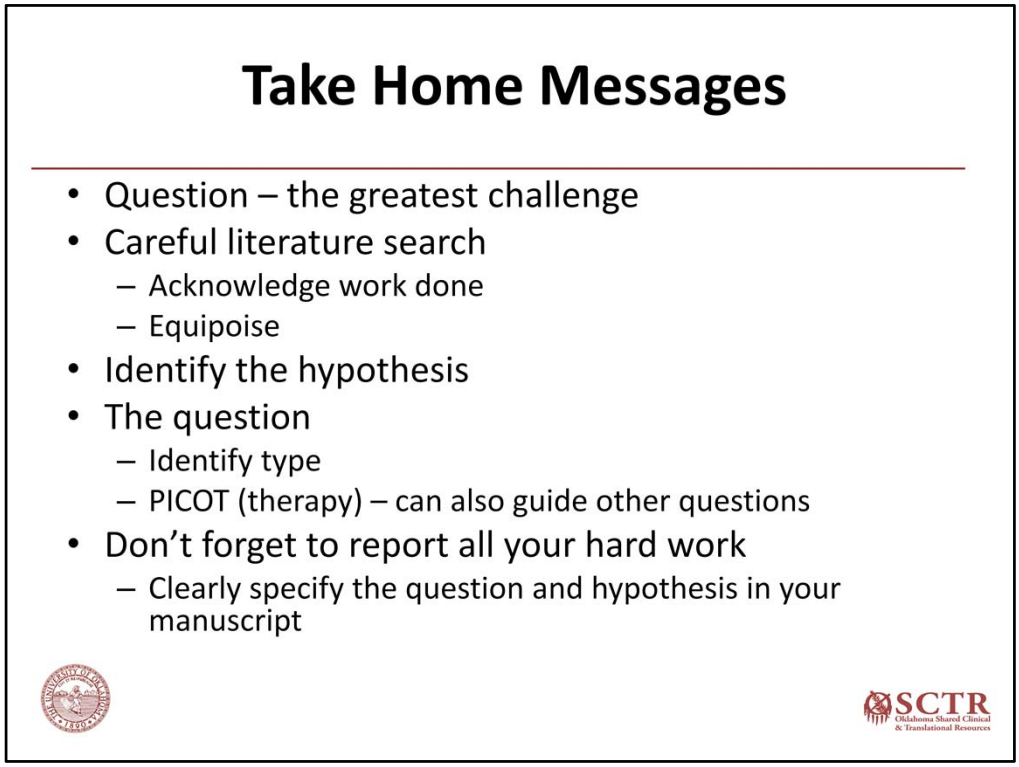
Reporting Your Research

CONSORT Guidelines **CONSOlidated Standards of Reporting Trials**	www.consort-statement.org
STROBE Statement **STrengthening the Reporting of OBservational studies in Epidemiology**	www.strobe-statement.org/
STARD Statement **STAndards for the Reporting of Diagnostic accuracy studies**	www.stard-statement.org/

How should you report results? There are guidelines to help you correctly and thoroughly report your results. The CONSORT guidelines are standards for reporting clincial trials. This group has also made guidelines to follow for reporting other types of studies. The STROBE statement is for reporting of observational studies in epidemiology. The STARTD statement is for reporting diagnostics accuracy studies.



Here are details of the CONSORT Checklist. You can see in the methods that the reporting of the hypothesis is required. As is all but the T, timing, from the PICOT framework. Participants, interventions (which includes both intervention and comparator groups) and the outcomes.



What is the take-home message? The question is the greatest challenge. For question to be relevant there must be clinical equipoise. Be sure to do a careful literature review and acknowledge work done by others. Identify the type of hypothesis you want to study. Next identify your question and identify the type of question you want to study. Use the PICOT framework to guide questions. PICOT is most relevant for questions about therapy but it can be used fully or partially for other questions. Also don't forget to report all your hard work and clearly specify the question in your manuscript.

I would like to acknowledge and thank Professor of Medicine, Nancy Heddle, from McMaster University in Hamilton Canada for sharing her slides with me and allowing me to modify them to fit the needs of this portion of the presentation.
Thanks to:
Nancy Heddle MSc.,FCSMLS(D), Professor
Department of Medicine
McMaster University for sharing her slides for modification for this talk.