Research Resource Guide

How is Research Done?

1. Identify the general problem area or your major research interest.

2. Review background information by reviewing the literature, reviewing the case studies, and discussing ideas with a research mentor and/or colleagues.

3. Define the research approach and formulate a research hypothesis, research objectives, or the research purpose. Consider the following. Is the approach[1]:

   Feasible (adequate subjects, adequate technical expertise, adequate facilities, adequate equipment, affordable in time and money, manageable in scope)
   Interesting to other professionals, policy makers, scientists, or clinicians
   Novel (confirms or refutes previous findings, extends previous findings, provides new findings) provides new methodology, innovative, validates a procedure or practice
   Ethical **(See section on IRB Approval)**
   Relevant to scientific knowledge, to clinical and health policy, to future research directions, to clinical practice, to public health

   Seeking guidance from a mentor is often helpful. Your preceptors can be a good place to start. Also, refer to the section on Research mentors for additional information.

4. Perform a more refined literature review pertaining to your area of research interest.

   Critically read and review related literature such as published research that appears in peer-reviewed journals or case study reports. A thorough familiarity with the work already done is mandatory in order to learn what has been done and what needs to be done. Your approach and objectives may change after thoroughly reviewing the literature.

5. Refine your research design or approach.

There are five basic types of research design:

Observational studies includes **cross-sectional**; **cohort**; and **case control**

Among the three observational studies, a **case control** study is used to examine the occurrence of a rare disease; a **cross-sectional** study is used to examine the prevalence of a disease or describe a condition at a single point in time; and a **cohort** study is used to examine incidence of a disease or to track disease progression or an intervention. (Prevalence is defined as the proportion of people in a population having the disease; incidence is defined as the proportion of people acquiring the disease over a period of time).

Experimental and Quasi-experimental.

An **experimental** study is used to establish a cause-effect relationship. A true experimental study requires a high degree of control, where subjects must be randomly assigned to experimental and control groups. A **quasi-experimental** study describes a situation where subjects cannot be randomly assigned to groups, or control groups cannot be used; or where the researcher has no control over allocation of treatments.

For example: You want to study the effects of a new weight loss drug. Your experimental group is the group that receives the weight loss drug. The control or comparison group is the standard of care.

Experimental = every adult patient who enters the clinic for weight loss treatment is randomly assigned to either the drug group or standard of care. Both treatments last for 6 months.

Quasi Experimental = every adult patient who enters the clinic for weight loss treatment selects whether they want the new drug or the standard of care. Both treatments last for 6 months.

6. State specific hypotheses, objectives, or a purpose.

Hypotheses are the specific beliefs you hold about what you expect to find in your study. The hypotheses essentially predict answers to your research question. Generally, a null hypothesis is stated. An example for the weight loss treatment discussed above would be the new weight loss drug will not produce weight loss different from the standard of care.

Objectives may take the place of a hypothesis or infer a hypothesis. For example, the objective of this study is to determine if the new weight loss drug causes weight loss in an obese adult population seeking weight loss treatment.

A purpose may perform the same function as a hypothesis or objective. For example, the purpose of this study is to examine the effects of a new weight loss drug on the weight of obese patients seeking weight loss treatment.

7. Plan your data collection preparation, entry, and analysis.

An organized and well-planned procedure for data collection preparation, entry, and analysis is essential for an effective research study. Map out how you will collect the information and how you will organize and if necessary code the information you gather. It is also a good idea to consult with a statistician regarding statistical tests and statistical software packages for your data analysis.

8. Prepare research project proposal.

Contact the IRB as you prepare your proposal to ensure the IRB will allow you begin preparations on your proposal.

9. Send research project proposal to the Institutional Review Board (IRB)

Consulting your IRB is required. **Do not start your research until you get approval from the IRB**.

Keep in mind that **all** research projects must be submitted to the IRB. The IRB, not the researcher, will determine whether the research is exempt from IRB review, requires an expedited review, or requires a full committee review.

What Sources Can I Use?

1. Hulley, Stephen B. et. al. Designing Clinical Research. 3rd ed. Philadelphia, PA: Wolters Kluwer, Lippincott Williams & Wilkins. 2007.

2. Stone, Judy. Conducting Clinical Research. 2nd ed. Cumberland, MD: Mountainside MD Press. 2010.

Formulating a Research Question:

3. http://www.theresearchassistant.com/tutorial/2-1.asp
4. http://www.vanderbilt.edu/writing/resources/Formulating%20Your%20Research%20Question.pdf
5. http://www.ijstd.org/article.asp?issn=0253-7184;year=2010;volume=31;issue=1;spage=47;epage=50;aulast=Aslam
6. http://health.usf.edu/research/ocr/invest_initiated.htm

Selecting a research design:

7. http://ctsi.ucsf.edu/training/pacctr-resources
8. http://www.ashpfoundation.org/MainMenuCategories/ResearchResourceCenter/FosteringYoungInvestigators/AJHPResearchFundamentalsSeries/HartungArticle.aspx
9. http://en.wikipedia.org/wiki/Clinical_study_design

Choosing Subjects:

10. http://healthcare.partners.org/phsirb/prescreen.htm
11. http://pats.atsjournals.org/cgi/content/full/4/2/189

Other resources

How to write a scientific research paper:

There are several aspects to writing a scientific paper;

Style and *Format* can vary by journal. It is best to identify the journal to which you intent to submit your research findings. All journals will have "Instructions to Authors". You can find this information in the journal itself or you may be directed to a website supplied by the publisher. You can also examine how the articles are presented.

Content will depend on your data and how you choose to present it. The following links may offer some helpful hints.

Department of Biology, George Mason University.
http://classweb.gmu.edu/biologyresources/writingguide/ScientificPaper.htm
Bates College
http://abacus.bates.edu/~ganderso/biology/resources/writing/HTWtoc.html
Columbia University
http://www.columbia.edu/cu/biology/ug/research/paper.html

How to write a case presentation:
http://www.ashp.org/s_ashp/docs/files/AJHP_HenryCohen.pdf
http://www.acponline.org/residents_fellows/competitions/abstract/prepare/clinvin_abs.htm

Proper use of Biological Safety Cabinets:
http://vimeo.com/9466020