INMED Scholarly Project
Original Scientific Research Guidelines

Key Concepts

- An engaging career in healthcare needs to include willingness to continue discovering more about diseases, risk factors, and health promotion.
- Conducting excellent research requires creating good questions, writing clear protocols, obtaining ethical approval, and publishing and applying the results.
- Research is made easier by the many online resources that are freely available, including databases, analytical tools, references, and teaching guidelines.[1]

Planning an Original Scientific Research Project

The steps involved in planning a research project include:

- Choose the question
- Select the study design
- Create the study protocol
- Get approval
- Conduct the research
- Analyze the data
- Disseminate the results

Choose a Good Question

As you apply what you have learned in healthcare, keep an inquisitive mind. Be on the lookout for good research questions. In this process, assure that the questions have not already been reliably answered and that the questions apply to genuine needs.

Complement your knowledge of the subject with what is known about the epidemiological, pathology, risk factors, environmental factors, diagnosis, treatment, rehabilitation, and the policy and economic impact of the health concern. As you

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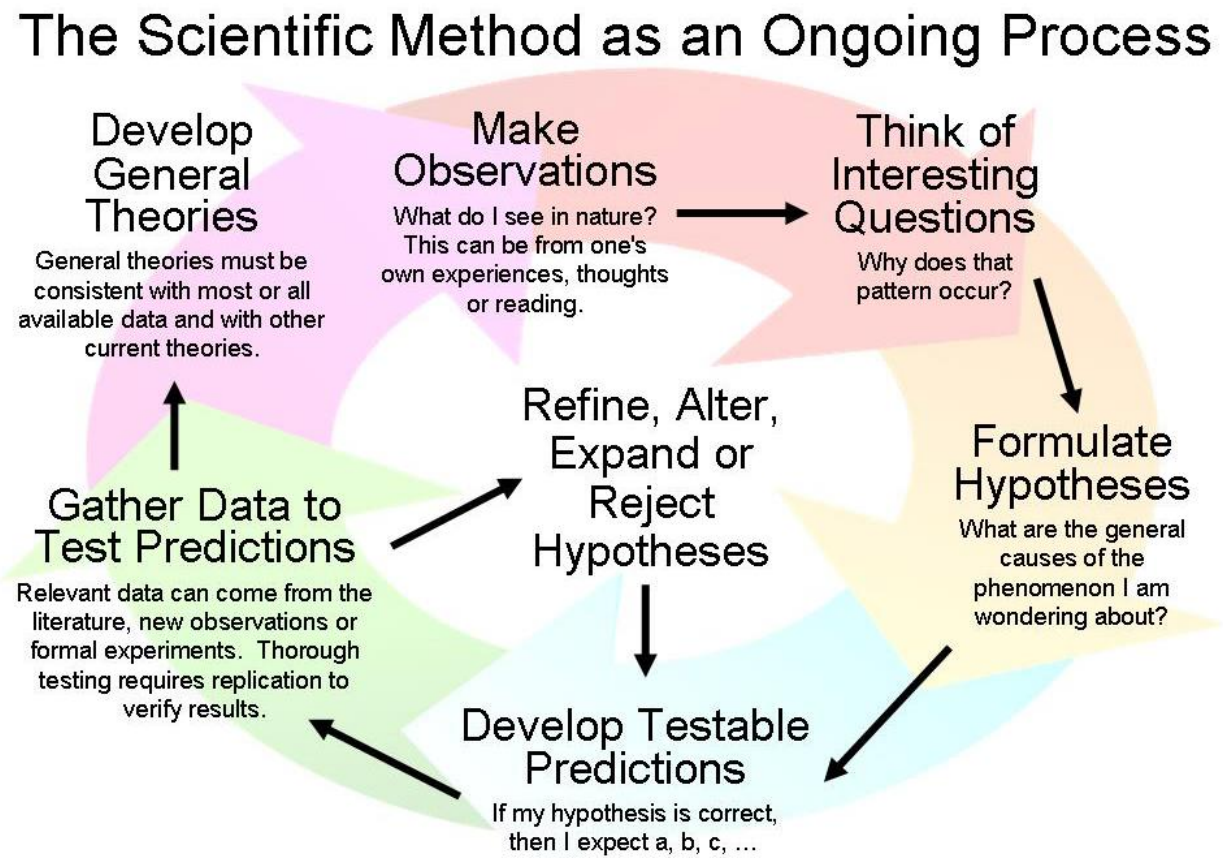
[1] This content is adapted, with permission, from the World Health Organization: *Basic Epidemiology* (2nd ed) by R. Bonita, R. Beaglehole, T. Kjellström, and WHO; 2006. Note: The World Health Organization is unable to verify the accuracy, approve the content, and takes no responsibility for this adaptation.

learn, identify fundamental gaps in knowledge that need to be closed through sound research endeavors.

Select the Study Design

As you proceed, consider the best study design to answer your questions, how to get potential approval and funding, and how to write up, present, and publish your findings. Especially in the beginning of one's career, research projects should be selected that do not require major resources.

The most fundamental study design is the Scientific Method:



The scientific method is the core process of healthcare research.[2]

Select the Appropriate Level of Evidence

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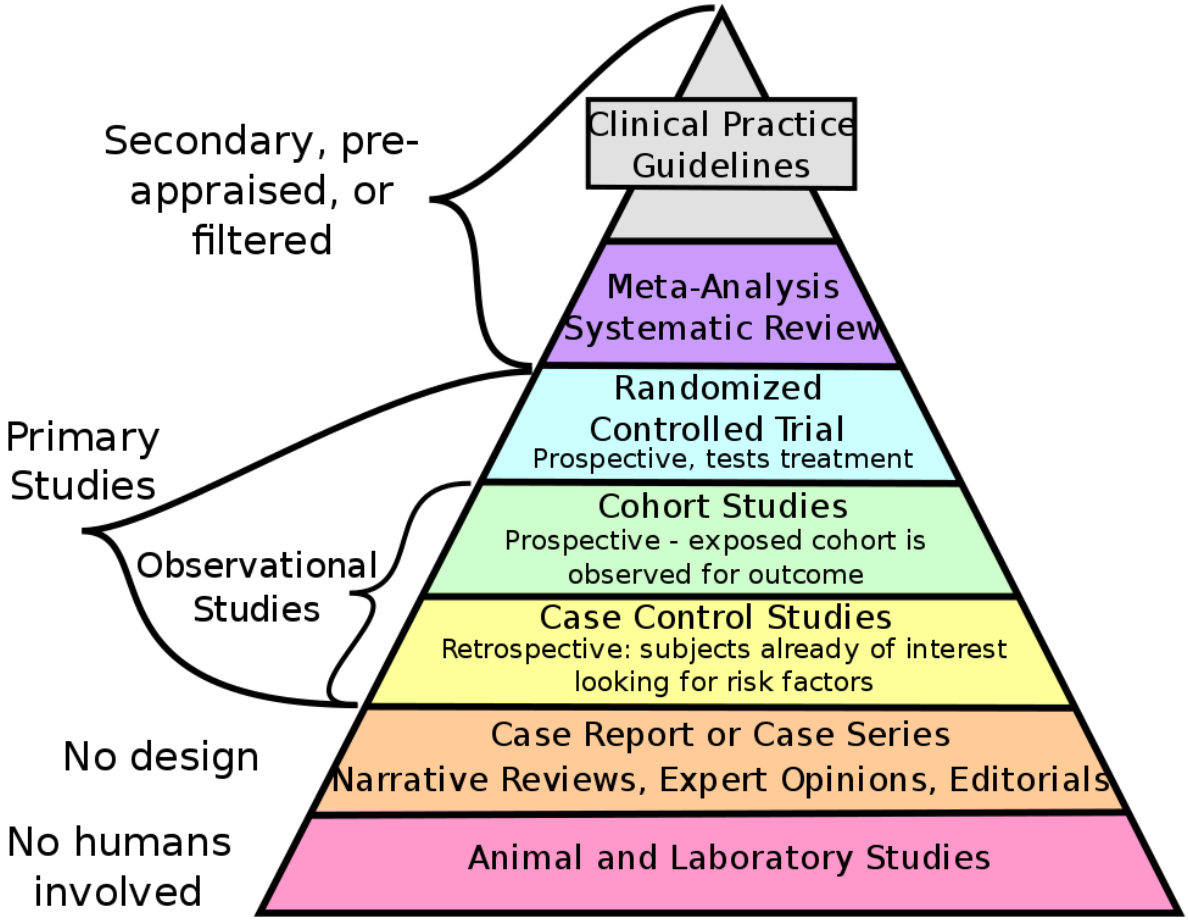
[2] Scientific Method 3.jpg. (2016, August 25). Wikimedia Commons, the free media repository. Retrieved 15:02, July 14, 2020 from https://commons.wikimedia.org/w/index.php?title=File:Scientific_Method_3.jpg&oldid=204814752.

The level of evidence (reliability) provided by any particular study is linked to its design. Therefore, one important element in study design is selecting what resulting level of evidence is achievable. In general, levels of evidence are considered to progress from expert opinion, through case-series, to cohort studies, randomized controlled trials and systematic reviews.



Reliability of epidemiological research increases with each level towards the top of this pyramid.[3]

Create the Study Protocol

In general, a study protocol should explain:

- What you intend to do: a clear description of the problem and your approach to solving it.

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[3] Research design and evidence.svg. (2020, April 30). Wikimedia Commons, the free media repository. Retrieved 16:08, May 2, 2020 from https://commons.wikimedia.org/w/index.php?title=File:Research_design_and_evidence.svg&oldid=415976870.

- A justification of the importance of the research question, and how it will contribute to knowledge.
- A description of the population, setting, intervention or observation.
- Details of the study design which should include:

    - the sampling strategy,
    - numbers of participants,
    - variables of interest, including potential confounding variables,
    - data collection methods, including pre-testing,
    - quality assurance,
    - data recording and data management
    - data processing and analysis.

- Budget and timetable (include funding sources and all resources needed).
- Roles and responsibilities of all involved.
- The ethical review committee to whom the proposal will be submitted for approval.
- Publication plan: how you will disseminate and apply the results
- Plans for any community feedback.

Research protocols may be subject to intense scrutiny, particularly where external funding and ethics approval are required.

Get Approval

Depending upon the setting of the research and the type of research being conducted, approval may be required from certifying bodies. One's research supervisor can assist with this process.

Conduct the Research

Research projects should generally be designed so that they can be done quickly, with flexibility for inevitable delays. Consider delegation of responsibilities among research collaborators.

Analyze the Data

There exists a wide choice of software for statistics and epidemiology, ranging from spreadsheets which can do limited analyses, through software made for specific analyses, to "all-purpose" software which can do almost all the statistical analyses required for research. One catalogue of epidemiological resources which are available free is Rothman's Episheet that can be downloaded for individual use. Public domain programs, such as OpenEpi and CDC's Epi Info are also available for free, in addition to commercially available programs.

In choosing software, you may wish to evaluate how the program handles data entry and missing variables, what the program's capacity is for updating and merging data sets, the types of analysis that it can do, and the presence of any report-writing features or graphics and mapping options.

Disseminate the Results

Consider in advance how to announce the results of the research project. This may be as simple as a verbal presentation to classmates or coworkers, followed by a written report, which could be circulated to interested people. The report could be used for teaching purposes or as a basis for further studies.

Guidelines for journal submission often contain very useful information about design and reporting specifications. Many of these requirements are impossible to correct in retrospect, so researchers do well to take into account journal submission requirements in the design of the project. Similarly, funding sources may stipulate that results must be published in an open access journal. Such journals may require registration of an experimental study with an approved registry to fulfill minimum requirements for publication.

Much epidemiological research is published in general medical journals, and some of these journals have a policy of making such research freely available on the web when it is relevant to developing countries. All the content of open access journals are free to readers and WHO runs a collaboration with major publishers to make all the content of their journals free or low-priced to institutions in developing countries. This is called the Health InterNetwork Access to Research Initiative (HINARI).