

Review Article

Basic Foundation of the Research: How to Conduct Research in Medical Sciences

Prof Mulazim Hussain Bukhari

Principal Azad Jammu Kashmir Medical College Muzaffarabad

Abstract

The research in medical sciences is conducted to find out health statistics, like prevalence, magnitude, seriousness, mortality and morbidity which basis for national and local planning for the authorities who are looking after the health system. It supports evidence-based practice and is the heart of medicine on which is based new drug trials, inventions, diagnostic tools, and drugs to evaluate their effectiveness to meet the requirements for bachelor's degrees, master's degrees, and postgraduate degrees.

This review article will introduce the basic principals and the foundation of the research in medical sciences. It begins with the research question, review of literature, aims, objectives, goals, rationales, hypothesis, statistical methods and ethics. All research depends on measurement. The article will also discuss the basic elements of good measurement, which include operational definition, measurement scales, reliability, and validity. Finally, the chapter reviews populations, sampling populations, and samples.

Keywords: Applied research, Basic research, Clinical research, Literature review, Research question, Rationale, Research ethics Topic

How to cite this:

Bukhari MH. Basic Foundation of the Research: How to Conduct Research in Medical Sciences. J Pak Soc Intern Med. 2022;3(4): 292-294

Corresponding Author: Prof. Mulazim Hussain Bukhari

Email: mulazim.hussain@gmail.com

Introduction

Starting medical research is a difficult process to start especially for the clinical side as this process is also a cumbersome for all beginners in the medical field because they are involved in clinical practice. But there is no way to get experience except through experience.”

Research is simply defined as the systematic collection, analysis, and interpretation (CIA) of data to answer specific questions or solve problems.¹

Ideally, starting any research to detect innovative findings and discoveries with the hope of improving healthcare system and practically, to get funding, to get promotion, to get a better job, to keep your job updated, it adds for the researchers' CVs to improve in their particle lives.

Fundamental Steps for the conduction of Scientific Research Selection

When conducting research, it is important to follow a step-by-step scientific procedure. There is actual need for research in this area in medical sciences and we must use the available resources (Medical Colleges, Universities etc.) to develop the research culture where the medical students grow for future need of the country.

There are mainly two main areas of study in medicine, whether it is basic science research or clinical science research (applied research), researchers usually have to follow these steps.²

1. What is the researcher's specialty?
2. What are the researchers interested in?
3. What is the researcher's scientific background?
4. What is the experience of the researcher?

The priority of Selection of Research Topics depends upon¹⁻²

The purpose of the introduction to the research report is to provide the rationale for the research. This rationale should address four issues:

1. What is the nature of the issue or problem the research investigates?
2. Why is this worthy of investigation?
3. What have previous researchers discovered about this issue or problem?
4. What does your research attempt to prove?

Suppose if you want to select the topic from clinical sciences, you must address few other questions other

that the above four questions. Always see the Impact on health or community or medical education:

1. Magnitude of the disease or issues
2. Seriousness of the issues
3. Preventability of the issues
4. Curability of the disease or issues
5. Availability of the intervention for these problems
6. Recommended solutions for these issues the characteristics of the proposed study are based on practical feasibility, cost-effectiveness and applicability of the results.

Research Question

Researchers need to make sure they have research questions. The question should be clear, specific, and reflect the purpose of the research. Also, there are no common sense or incomplete answers in the "literature", and answers must be found. Questions solve, or at least help solve, the problem under investigation.³⁴ Example: suppose a person wants to make research in the field of cardiology and the topic of research is myocardial infarction. Let's make a research question. "Does Hypocholesterolemic agent decrease the risk of heart attacks?"

Now one should search the answer through the literature review. If you can find the answer, then no need of research but, if not found then, you can cotunnite.

What is Literature Search?

This relates to ongoing research through peer-reviewed articles in electronic media (best sources), bibliographies, articles and conference papers, medical news, research papers, and other sources from authenticated social media; A study of academic papers on the subject in question. When considering the literature, it is very important to consider both the primary works and the studies that correspond to the primary works and focus on primary sources. In some cases, secondary sources are also valuable.⁵

Important factors for Literature Review

It should relate to a specific topic, field of study, or theory and include a description, summary, and critical evaluation of each work. Be a self-contained review of work on a single subject. Place each work in the context of its contribution to the understanding of the subject under consideration. Describe the relationship between each work and other works. Identify new interpretations and highlight gaps with previous research. Resolve discrepancies between seemingly contradictory previous studies. Identify areas of previous research to avoid duplication of effort. Place your work (dissertation or dissertation) in the context of existing literature.^{5,6}

Components of Literature Search

Like most scholarly works, literary criticism should contain at least three basic elements. An introductory or

background information section. The body of the review, including a discussion of the source. Finally, a section of conclusions and/or recommendations that concludes the paper.⁵

Rationale of the Medical research

A research rationale is a justification for conducting a particular study. It explains why researchers focus on the subject matter, its importance, and the gaps research is trying to fill.⁷

Research Goal & Objectives

Research aims are focused on the outcomes of short term and long term projects, written as a numbered list. A research aims are written in numbers, in objective forms and in a single sentence or short paragraph.⁸ It should be given at the beginning of the study to guide the researcher in the process of formulating the research question and hypotheses. It also helps with prioritization. Allow the reader or consumer of your work to determine whether the investigator has achieved these goals.⁹ A goal broadly describes the goal of the work. A goal is the result you want to achieve. Goals are intangible and immeasurable, but goals are defined in relation to specific goals. For example, the goal of 'provide excellent customer service' is invisible, but the goal of 'reduce customer wait time to one he is'.¹⁰ The research goals are closely related to the research question which covers all sides of the issue. These must be very specific, arranged in a logical order. It is given in action verbs that can be evaluated, such as describe, identify, measure, compare. These must be achievable in the given resources, available time, mutually exclusive, and there should be no repetition or duplication.¹¹

Research Hypothesis

A research hypothesis is an expectation statement or prediction tested by a study, defined as a prediction or statement of the relationship between one or more independent variables predisposing to a risk factor and the dependent variable (outcome/condition/disease). This is important in any research because it determines the types of data researchers collect, the methods used to collect the data, and the statistical procedures used to analyze the data. There are four types of hypotheses: descriptive hypotheses, correlation hypotheses, population difference hypotheses, and cause and effect hypotheses.

Essentially, it transforms the problem statement into an accurate and well-defined prediction of the expected outcome. It must be emphasized that hypotheses are not arbitrary guesses, but rather reflect the depth of knowledge, imagination, and experience of the researcher.¹²

Choosing the Measurement

The purpose of this section is to understand: How to

choose an appropriate outcome measure. Relative merits of objective and subjective measurements. Methods to reduce measurement error in clinical trials. The choice of scientific measurements is also important for drawing correct conclusions. Some measurements do not adequately measure phenomena and may not reflect the real world.¹³

Ethical Considerations

Ethical considerations in research are a set of principles that guide research design and practice. These principles include voluntary participation, informed consent, anonymity, confidentiality, likelihood of harm, and reporting of results. Helsinki World Medical Association Declaration: Recommendations for guiding physicians in human biomedical research. It was revised at the 18th World Medical Congress, Helsinki, Finland, 1964, at the 29th World Medical Congress, Tokyo, 1975, and subsequently revised in 2002.¹⁴

Basic Principles of Ethical Research

There are four main areas which should be followed for any medical research, like respect for population taking part in the research. Second principal is the "autonomy" where all individuals should be treated as autonomous agents, as those with limited autonomy are entitled to protection. The third important principle is beneficence, do no harm, maximize benefit, and minimize potential harm. The fourth principle is justice, always there should be fair distribution of burdens and benefits of research in whole population.

The Mission of Medical Doctor

World Medical Association Declaration of Geneva: "My patient's health will be my first consideration"; International Code of Medical Ethics: "Any act or advice that may weaken a person's physical or mental stamina should only be used to his advantage."¹⁵⁻¹⁶

Proper Study Design, Research Populations, Sampling Populations and Samples

A study must be based on the correct study design and sample size in order to draw correct conclusions from the study. Population means the whole group that is included in the study and from which we want to draw conclusions and inferences, while sample is the specific group from which we collect data and draw conclusions. The sample size is always smaller than the total population size. In research, populations do not always refer to humans. A group that contains objects, events, organizations, countries, species, organisms, or anything else you want to study.¹⁷

Summary

Research is an effort to discover new facts, processes, methods, and techniques through an academic study of a series of critical investigations. A scientific study or investigation conducted to discover facts. Revise theories and laws based on new facts and their practical

application. Clinical studies should be conducted to diagnose new diseases in the community and to control epidemics or endemic diseases. It must be for disease prevention and control, outbreaks, and to assess curative and preventive measures. Studies should be used to study the neurohistory of disease and the planning or execution of health series.

Conflict of Interest: *None*

Funding Source: *None*

References

1. Bahadoran Z, Jeddi S, Mirmiran P, Ghasemi A. The Principles of Biomedical Scientific Writing: Introduction. *Int J Endocrinol Metab.* 2018;16(4):e84795.
2. Blystone RV, Blodgett K. WWW the scientific method. *CBE Life Sci Educ.* 2006;5(1):7-11.
3. Ratan SK, Anand T, Ratan J. Formulation of Research Question - Stepwise Approach. *J Indian Assoc Pediatr Surg.* 2019;24(1):15-20.
4. Fandino W. Formulating a good research question: Pearls and pitfalls. *Indian J Anaesth.* 2019;63(8):611-6.
5. Maggio LA, Sewell JL, Artino AR Jr. The Literature Review: A Foundation for High-Quality Medical Education Research. *J Grad Med Educ.* 2016;8(3):297-303.
6. Leite DFB, Padilha MAS, Cecatti JG. Approaching literature review for academic purposes: The Literature Review Checklist. *Clinics (Sao Paulo).* 2019; doi: 10.6061/clinics/2019/e1403.
7. How to write a rationale of the research. [Updated 2021,cited2022] Available from: [https://www.cwauthors.com/article/how-to-write-the-rationale-for-your-research]
8. Doody O, Bailey ME. Setting a research question, aim and objective. *Nurse Res.* 2016;23(4):19-23.
9. Farrugia P, Petrisor BA, Farrokhyar F, Bhandari M. Practical tips for surgical research: Research questions, hypotheses and objectives. *Can J Surg.* 2010; 53(4): 278-81.
10. Bailey RR. Goal Setting and Action Planning for Health Behavior Change. *Am J Lifestyle Med.* 2017;13(6): 615-8.
11. Al-Jundi A, Sakka S. Protocol Writing in Clinical Research. *J Clin Diagn Res.* 2016;10(11):ZE10-13.
12. Gasparyan AY, Ayvazyan L, Mukanova U, Yessirkepov M, Kitas GD. Scientific Hypotheses: Writing, Promoting, and Predicting Implications. *J Korean Med Sci.* 2019;34(45):e300.
13. Yip C, Han NR, Sng BL. Legal and ethical issues in research. *Indian J Anaesth.* 2016;60(9):684-8.
14. Artal R, Rubinfeld S. Ethical issues in research. *Best Pract Res Clin Obstet Gynaecol.* 2017;43(1):107-114.
15. Daynes WG. The mission hospital doctor. *S Afr Med J.* 1981;59(9):307-8.
16. Declaration Of Helsinki. *JAMA.* 1966;197(11):32.
17. Banerjee A, Chaudhury S. Statistics without tears: Populations and samples. *Ind Psychiatry J.* 2010;19(1):60-5.