REVIEW ARTICLE

Basic guidelines on writing a research proposal for health science students

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ABSTRACT:
Research is a common phenomenon to investigate the resolution of existing problems and generate the new dimension of knowledge in all sectors. Medical research is an integral part of medical science which can transform evidence-based clinical practice. Wide range stakeholders must take hold of the principles of the scientific method to know the worth and boundaries of clinical research, though they could not conduct health research by themselves. This review article aimed to focus on basic guidelines for writing a research proposal for health science students which is limited to maximum ten pages.

Keywords: Research proposal, Guidelines, Basics of research, research methods, health research.

1. Abstract: Abstract of a research article contains outline of around 200-300 words. The scientific articles in medical science has been changed from a descriptive style in seventeenth century to very organized structure in twentieth century known as introduction, methods, results and discussion (IMRAD). Methodology part must contains detailed, design of the study, the sample collection procedures and the research tool used.

2. Title/topic: A best topic must contain 10-15 words which can satisfactorily explain the content of the proposal. The most read part of research proposal is title, it must be, catchy, concise and informative. A competent topic attract reader’s attention.

3. Introduction: Research is a scientific and systematic inquiry or investigation into a topic to realize knowledge and understanding of a phenomenon. It may be described as a voyage which results in the invention of the latest understanding or revision of facts, theories, concepts and applications. Sekaran a scientist defined “research is as systematic, organized, data based, critical scientific enquiry or investigation of a particular problem, undertaken with the objective of finding answers or solutions.” Most of the young researchers in the beginning neither understand the meaning of research proposal nor its importance. A detailed written document about the proposed study, designed for a problem is research proposal. It must be highlighted the advantages and outcomes of the proposed study. No matter of field or level of study, a research proposal forms the idea of scientific research. A research proposal must deal with the successive questions: What you want to achieve, why one wants to perform and how you achieve it. Aim of this review is to spotlight the basic steps about and how to write research proposal. Elements of research proposal are described below.
3.1. **Background**: Introduction is an initial pitch of an idea; it sets the scene and puts the research in context. Investigators must be familiar with the knowledge about the study problem and to explore comparable research done by other’s. Its purpose is to determine skeleton for research, so that readers can understand how this study is related to other research. It must transmit to the reader, what researcher wants to do or find, what necessitates the study and your passion for the subject. Some questions which can be used to assess the importance of the study are: (i) Why must the research be done? (ii) How will it be done and what is going to be its outcome for humankind. (iii) What have we already realized on the topic? (iii) What has not been answered adequately in previous research and practice? (iv) How will this research increase knowledge, practice and policy in this area? A number of the evaluation committees, expect the last two questions, elaborated under a separate heading of ‘background and significance.’ Statement of problem is crucial for developing a research proposal. It helps researcher to explain about the solution of the problem systematically, reproducibility, importance, priority in the nation and rational of the study.

3.2. **Statement of problem**: A research problem is definite or clear statement about the area of concern, a condition to be improved upon, an issue to be eliminated, or a troubling question which exists in scientific literature, in theory, or in practice that points for meaningful investigation.

3.3. **Rationale and justification**: A rationale is an argument in favor of implementing the proposed project by researchers or research organization.

Justification: It includes explanation the design and methods used in the research and also the exact reason why the research is conducted.

3.4. **Significance of the study**: A written statement which justify why this research is required and also includes, importance and impact it has on the field. It also explains the contribution to the new knowledge and potential benefits to the scientific worlds.

3.5. **Objectives**: The research objectives are goal or aim of the researcher wants to achieve by conducting research. The objectives related to parameters or tools used to achieve the aim are generally stated as ‘general’ and ‘specific’ objectives. General objective means the overall goal of the scientific research while there are two types of specific objective. **Primary**: To determine effectiveness of Satavari churna in maternal and child health in the study population by comparing the interventional and non-interventional group is primary objective. **Secondary**: Study of cost effectiveness of the Satavari is secondary objective. Young researchers are advised to avoid the too many or over-ambitious objectives which can’t be achieved by the proposal.

3.6. **Hypotheses**: A provisional prediction of the relationship between two or more variables is called hypothesis. Alternatively hypothesis translates the topic statement into a particular unambiguous prediction of expected outcomes. It is not a random guess. Hypothesis must reflect the knowledge and imagination of researcher. All variables relevant to the study must be considered during the formulation of hypothesis. Mothers who are actively involved in health education shows positive changes than lectture supported education in child feeding behavior. In this health education child feeding is dependent variables.

3.7. **Conceptual framework**: Analytical tool with several variations and contexts, often applied in a number of categories, where an overall picture is required. It is essential to make conceptual distinction and organize ideas. Strong conceptual frameworks capture something real and do that during a way that’s easy to recollect and apply.

3.8. **Operational definitions of terms and variables**: **Variables**: Key variables, their methods and unite of measurement must be identified during planning of the research. There are four types of variables in research. **Dependent**: Variables which depends on independent variables. Experimental changes in independent variables has been observed of recorded in dependent variables. Effect, outcome, consequence, result, condition, disease etc are the examples of dependent variables. In an experiment whether stress effect the heart rate, stress is independent and heart rate is dependent variables. **Independent**: Variables which are treated in an experiment in order to see the effect on those variables proposed as being dependent on them. Ccause, input, predisposing factor, risk factor, determinant, antecedent, characteristic are the examples of independent variables. In an experiment which breed of chicken can produce large size egg, Breed in independent
while size of egg is dependent variables. Confounding:
Variables which can intervene, influence independent
variables variables, are called confounding variables.
Sociodemographic: variables which are of frequent
relevance in group or populations investigation (sex, age,
ethnic origin, education, legal status, social situation etc)

4. Review of literature : This part contains all sources of
scientific evidence related to the topic. It can be achieved
by extensive and critical study of the previous research
and literature and personal communication with experts.
Literature review support for the further understanding of
the proposed research problem which lead to refinement of
the problem, to recognize the study variables, conceptualize
their relationships and helps for formulation and selection of
a research hypothesis. In the present era of digitalization
and easy accessibility, there is an enormous amount of
relevant data available, making it a challenge for the
researcher to include all of it in the review. It is crucial
to structure this section intelligently so that the reader can
grasp the argument related to the study in relation to that of
other researchers, that your work is original and innovative.
It is preferable to summarize each article in a paragraph,
highlighting the details relevant to the topic of interest. The
progression of review can move from the more general to the
more focused studies. Literature should include supporting
data, disagreements and controversies. Five ‘C’s (concise,
clear, critical, convincing and contributive) must be kept in
mind while writing a review of literature.

5. Methodology : This part of a proposal explains about
the details of the research process, so it is very important
for a best proposal. This section of proposal must be sound
so that researcher can get sufficient information. A good
proposal should contain detail enough information so that
another qualified researcher can implement the study. Steps
of method must answer each question or can test every
hypothesis mentioned in the question/hypothesis section.
During the research design stage, It is important to consult
a biostatistician to resolve the methodological issues before
submission of the proposal.

This section should include:

5.1 Research design : This part is the core of a research
proposal. In research design, selection of research strategy
is most important step for an investigator. Role of this
section is to convince the reader that research design and
methods of study correctly address the research problem
and to impress upon the reader that the methodology/
sources chosen are appropriate for the precise topic. It
should be unmistakably tied to the specific aims of your
study. Depending upon the research objectives, study
may be descriptive, analytical, experimental, operational or
a combination of these. Researcher must be clear about
the inclusion and exclusion criteria, sampling procedure for
representativeness and reliability of the sample and how
to minimize sampling errors. The issue of validity, both
internal and external of the study results is key concern
during the sampling procedure. Comparison or control
groups are enrolled in the study to extend the validity of the
results. Analytical, epidemiological, experimental studies
of drug trials, effects of intervention programmes and in
many other investigations control group is mandatory.

5.2 Research method : It is the strategies, processes or
techniques utilized in the collection of data or evidence
for analysis in order to uncover new information or create
better understanding of the topic. There are different
types of research methods which use different tools for data
collection.

5.3 Research type : it is of two types quantitative and
qualitative.

5.1.1 Quantitative research : The process of gathering and
analyzing numerical data which is used to find average and
patterns, make predictions, test relationships and generalize
the results to wider populations.

5.1.2 Qualitative research : The process of gathering
non numerical, unquantifiable data like feelings, emotions,
sounds elements. The information collected cannot be
analysed by mathematical techniques.

5.4 Sample size : Research proposal must contain enough
information about the basis on which the sample size is
calculated. Which must be justifiable. To increase the
value of the study, to test the research hypothesis a larger
sample size is required. Computer software programmes
are available to calculate the sample size.

5.5 Interventions : A strategies designed to develop or to
measure behavioral changes or to improve health status. It
include educational programs, new drug, stronger policies,
changes in the environment. During introduction of a new drug or device, the outline of the drugs e.g. manufacturer, date of manufacturing and expiry date, proprietary names of the drug, composition, dose, times of administration must be available. If the intervention is under the phases of experiment or commercially available for other indications, sufficient information must be available about the pre-clinical investigations in animals. If the research is already conducted in humans subjects, it must be approved from the drug regulatory authority of the country.

5.6 Rigor (soundness of the research) : This addresses the strength of the research with respect to its neutrality, consistency and applicability. Rigor must be reflected throughout the proposal.

5.6.1 Neutrality : It refers to the robustness of a research method against bias. The author should convey the measures taken to avoid bias, viz. blinding and randomization. In an elaborate way, thus ensuring that the result obtained from the adopted method is purely by chance and not influenced by other confounding variables.

5.6.2 Consistency : Consistency considers whether the findings are going to be consistent, while the inquiry was replicated with equivalent participants and during a similar context. This can be achieved by adopting standard and universally accepted methods and scales.

5.6.3 Applicability : It is defined as the extent of the application of the outcome of the research for broader population under real world conditions.

5.7. Research setting : It includes all the related facets of the study like population to be studied sampling frame, the place of study, time of study.

5.7.1 Study instruments : A research instrument is a tool used to collect, measure and analyze data related to research interests. These tools are most commonly used in health sciences, social sciences and education to assess patients, clients, students, teachers, staff, etc. A research instrument can include interviews, tests, surveys, or checklists. The Research instrument is usually determined by researcher and is tied to the study methodology.

5.7.2 Data collection : A brief explanation of the proforma for data collection must be developed during a study. For example a study on vital sign measurement; participant arrival time, 5-10 minutes rest, name of apparatus to be used, room for measurement, sitting or lying position, which arm first, blood pressure cuff detail and its placement, person who will take the measurement to reduce the confusion, delays and errors.

5.7.3 Data analysis : This section deals with the reduction and reconstruction of collected information. The researcher is predicted to elucidate the steps adopted for processing, coding and sorting the data obtained. Various tests to be applied to analyse data for its robustness and significance. Researcher should also mention the statistical methods or suitable software to be applied for the data analysis. What procedures to be used for accounting the missing, unused or spurious data that must be mentioned.

5.7.4. Research outcome : Research outcome is applied to clinical or population or healthcare system in terms of advantages to the patient and society. The intent of the research is to spot short falls in practice and to develop strategies to enhance care.

6. Ethical issues : Medical research introduces special moral and ethical issues that are not usually encountered by other researchers during data collection and hence, the researcher should take special care in ensuring that ethical standards are met. Ethical considerations solicit for protection of the participants’ rights (right to self-determination, right to privacy, right to autonomy, right to confidentiality, right to fair treatment and right to protection from discomfort and harm), during obtaining consent and therefore the institutional review process (ethical approval). It can be unethical if it exposes human subjects to any potential unnecessary risk without additional benefit. Two important documents must be added to the proposal before submission to the ethical committee for the ethical approval. Other than this, researcher should furnish a statement of conflict of interest.

6.1 Ethics : The proposed research must be conducted in accordance with Global declaration of Helsinki on ethics for medical research involving human Subjects. Whether the research design capable of answering the research question, is selection of participants justifiable. Inclusion of vulnerable subjects (prisoners, minors, persons, mentally disabled, pregnant, unconscious, geriatrics) as study subjects require special justification. In
international research, study population must be benefited from the outcome of the research and therefore the study should not be conducted exclusively for the advantage of another people. For the financial or other inducement to the participants to be enrolled, Justification is mandatory. In terms of risk/benefit ratio, interventions must be justified. Risk is not limited to physical harm, psychological and social risks also to be considered. For observational study, all possible measures must be considered to maintain the confidentiality.

7. Consent form: Consent form is an important form attached to the proposal. Simple, maternal language which can be easily understood by the participants. Technical terms must be avoided as maximum as possible. When subjects are illiterate, special care must be taken. Consent form should explain why the study is being done and why the subjects are asked to participate in the study. Whether the study participants get any benefits must be included in the consent form. Treatment for anticipated discomfort or adverse effects, including psychological and social risks must be covered. Unknown or a comparative risk should be stated. Participant has right to withdraw from the study at any point of time without affecting further medical aid. Participant should be assured for the confidentiality of the finding.

8. Gantt chart: The summary of activities at left side, time in weeks, days or months at right side. Draw fat lines to point the task that are going to be performed.

9. References/Citation: The proposal should have relevant references. As mentioned in research article, cite the sources utilized for developing proposal. Although the words ‘references and bibliography’ are different, they’re used interchangeably. A reference contains only sources cited within the text of the proposal while a bibliography is list of all the sources consulted to get the whole proposal. It contains a list of references those cited or not not cited.

10. Budget: Item wise justifiable budget must be included which indicate how the study is going to be funded. A researcher predict and cost, all aspects of the research then add a further allowance for unpr edictable disasters, delays and rising costs.

11. Summary/application of research: This part of proposal communicates the researcher’s knowledge, method and conveys the emergent nature of the research design. Also refine, revise and extend the existing knowledge in the field of investigation. Summary also mention how the findings of the research is going to be disseminated among the peer readers, practitioners, participants and funding agencies.

12. Appendixes: This section includes documents which support the proposal and application process. The appendices is limited for every proposal but documents that are usually required include, cover letters sent to appropriate stakeholders, interview protocols, sample of consent form and patient information, letters to the concerned authority seeking permission to execute the study, measurement tools, questionairs in local language, proof of purchase of the instrument.

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REFERENCES


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