

Selecting a research topic

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We, the medical students, interns, residents, faculty, physicians and the health professionals are obligated to carry out research as a part of our medical training.¹ The current medical knowledge which we can define as curriculum per se is based on continuous process of 'evidence accumulation' through observations over period of centuries and since 1950s has been organized in the form of more sophisticated research methodologies.^{2,3} Despite these significant knowledge advances, the need for more comprehensive information regarding specific health problems continues to grow.⁴⁻⁷ The research for health practitioners, therefore, becomes more than a training obligation. However, the trepidation of 'where to begin '?' remains a bottleneck for most of young investigators.⁸ The objective of the present text is to share few wide-ranging principles about the selection of a research topic by a new investigator working with a team of investigators. We use the word 'team' here because research idea in most cases is perceived by one investigator facilitated by others in the form of well thought-out methodology and finally executed as a research project where at least one of them can take on the role of principal investigator.⁹ Involvements of senior researchers in these early-career experiences are critical to the development of young researchers. This text is for all those who are planning to begin their first research endeavour mentioned as "colleagues" in this text.

What can be your research topic?

Anyone who wishes to embark on research should at first keep abreast of the literature regarding the field in which he or she is planning the research.⁵ With the knowledge base, the personal interests of the researchers play an important role in identifying topics that match their interests. Nonetheless, the most important consideration while beginning any research should be that the identified research topic addresses a knowledge gap.^{4,5} In health sciences, we can come across these lacunae while practicing medicine.⁶ We illustrate this with an example. Suppose the standard treatment for disease 'D' is drug 'A' based on a previous research showing that 30% of patients receiving drug 'A' recover from 'D' compared to 10% of other patients with 'D' receiving a placebo drug. Therefore the evidence in this case is that the drug A is more beneficial than receiving no treatment in patients with 'D'.

Now, colleagues come to know that a pharmaceutical company has recently developed a drug 'B'. The data published from the company indicated that drug 'B' might have a similar mechanism of action as of drug 'A'. The data also showed that drug 'B' in normal human subjects had a better absorption and half-life than drug 'A', and the drug could be safely used in patients with 'D'. However, the pharmaceutical company had not performed a research comparing the efficacy of drug 'B' in patients with 'D'. From clinical point of view and based on knowledge gap, research topic can be about drug 'B' that whether it is superior or similar in its effect to drug 'A' when prescribed in patients with 'D'. Knowledge gaps like these can only be identified when investigators update themselves regularly about the recent publications (original articles and conference proceedings) regarding their specific topics of interest.¹⁰ More often than not, knowledge gaps and propositions of future research are mentioned towards the end of the scientific reports.⁷ Once knowledge gaps are identified by new investigators, the next step is to define the research question.

From a possible knowledge gap to a research question:

Putting together a question in well expressed manner represents an important step because it helps in: 1) substantiation that the knowledge gap has not been previously answered in the literature and 2) refining the future research objectives.¹¹ Therefore, research questions can be of several types based on their objectives and study design such as descriptive, surveillance, observational, and interventional, the details of which can be found elsewhere.¹² In its current form, an interventional controlled study is given "primary importance" such as comparing outcomes of drug 'A' and drug 'B' when given in patients with disease 'D'. However, it is essential for new researchers to understand that for their first experience they can decide to conduct a more straightforward descriptive study such as what is the burden of Disease 'D' in a particular population? Nonetheless, their study questions must address knowledge gaps.

Formulating a research question:

Several approaches are used to formulate a research

question.⁶ For our example, we are using here the PICO (Population, Intervention, Control, and Outcome) strategy because of its relevance to the clinical research questions.¹¹ It constitutes of defining four aspect of a health research question. In our example, the population (which can be a patient, group of patients, or a health problem) consists of the patients with disease 'D' for which we do not know a 100% cure. The intervention is drug 'B' for which we lack knowledge about its efficacy in patients with D. The control or comparison is drug 'A' because the previous knowledge has shown that it was better than placebo for curing 'D'. Finally, the outcome is complete recovery from disease 'D'. The colleagues should use established definitions from literature when defining the above-mentioned aspects of their research questions. A research question can be formulated as: Does drug 'B' (intervention) cure (outcome) more patients with disease 'D' (population) than the drug 'B' (control)? In statistical terms, their future research will test a hypothesis that drug 'B' leads to a higher proportion of cured patients with disease 'D' than drug 'A'. It is noteworthy that in observational studies of disease causes, the intervention can be an exposition to a certain risk factor, and the comparison group represents the non-exposition e.g. among admitted patients in medical ward, those who had a positive smoking history (exposition) are more likely to have lung cancer (outcome) than those who had no smoking history (control)? Further, colleagues should keep in mind that some research questions are of qualitative nature where comparison or outcomes can not be included within e.g. describing the process of care in a patients with spinal cord injuries.¹³

How we can confirm that our research question is a knowledge gap?

No research undertaking can skip an exhaustive literature search.¹¹ For a researcher, it is extremely frustrating to know at the end of research exercise that the knowledge gap that he or she is trying to answer had been responded and published well before the start of the research. Therefore, before beginning any research, colleagues should devote all their energies to confirm that their research question has not been answered before. This process can start from familiarising information available in medical textbooks. However, there is always a time gap ranging from one to several years before the research results published in medical journals and conference proceedings become the part of textbooks.¹⁴ Colleagues are therefore referred to perform literature search on the biomedicine databases such as Medical Literature Analysis and Retrieval System Online (commonly known as MEDLINE), Cumulative Index to Nursing and Allied Health Literature (or CINAHL), Pakistani Medical Journals Database (PakMediNet) etc.¹¹ The importance of publications not available in these conventional databases

(usually known as grey literature) i.e. dissertation, theses, scientific reports, and non-indexed publications can not be subsided and every attempt should be made to make the literature search exhaustive. It is recommended that this work should be performed by more than one investigator while using two or more databases and should include a manual search of the list of selected references for grey literature. Methods of performing such a search have been discussed elsewhere and must be considered by the colleagues according to their feasibility.^{11,14} It is important to keep in mind that quality of research reports should be carefully and critically judged using guidelines available elsewhere,⁷ as unclear methods lead to uncertainty and may itself be a knowledge gap. Nonetheless, we strongly suggest that at the end of the literature search, colleagues should write a report with methods used for literature search, their findings, and identified knowledge gaps,¹¹ to stimulate discussions with other colleagues to confirm and improve the research question in the light of these reports. It is highly recommended that researchers whether new or experienced to transform their literature review reports into peer-reviewed comprehensive review articles which can inform other researchers of the possible avenues of research and can be used as an argument to support identified research questions via peer-review.

Practical considerations for the selected research topic:

Once it has been established that the research question responds to a knowledge gap, investigators need to consider the practical aspects required for responding to the question through research processes.^{10,15} Cummings et al have cited these as mnemonic FINER: Feasibility, Interest, Novelty, Ethics, and Relevance.^{11,15} For instance, even if the research question is interesting the feasibility of research can be challenged if the time, resource, and setting requirements do not match with research needs.¹⁶ Before beginning the research, the investigators must ensure that they have adequate support to complete their research. Similarly, the interest of investigators in responding to a certain knowledge gap plays a major role in conducting research which requires time and patience.⁹ Further, the investigators should be prepared to confront various evaluation committees to prove that their selected research topic yields novel information.^{11,14} Colleagues should keep in mind that if their selected research topics and proposed methods involve human subjects or biological materials then permissions are needed to be sought from competent authorities in their research settings (e.g. ethics review board)¹⁷ and their objectives with proposed design should qualify institutional ethical standards.¹⁷ Finally, the investigators should keep in their mind that research must be relevant to the knowledge

needs and serve the ultimate aim of improving health of the patients and the society.¹⁴

Conclusion

There are no short-cuts in selecting a research topic.^{5,11} Without adequate knowledge, it will always be difficult for investigators to defend the originality of their research topic in front of the review committee.^{10,14} The aim of internationally accredited medical journals such as Journal of Pakistan Medical Association is to publish new knowledge acquired by using valid and reliable methods.^{4,7} After reading the title and objectives of any given manuscript, editors and reviewers closely scrutinize how investigators have gone through the identification and confirmation of a knowledge gap, formulation of a research question, and articulation of their research hypotheses. Therefore, colleagues should make every effort to explain clearly their approach in selecting their research topic in the manuscript.⁷ Lastly, colleagues should not hesitate to seek help from those with experience in research methods to strengthen their approach of research topic selection.¹⁶

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