

RESEARCH NOTE

Exploring valuable research topics: an overview and guide for early-career medical researchers

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Abstract

Background and objective: Formulating impactful and innovative research questions is a fundamental yet challenging competency for early-career medical researchers. Novice investigators frequently struggle to identify topics that are simultaneously feasible and scientifically valuable, often leading to the inefficient use of time, funding, and institutional resources. This communication aims to provide a practical framework and concise guide for junior researchers to assist in selecting research questions that are relevant, novel, and clinically meaningful.

Methods: This review was conducted by purposive search of the current literature in order to outline twelve key strategic approaches for identifying knowledge gaps, refining preliminary research ideas, and ensuring alignment with current priorities within the rapidly evolving biomedical science landscape.

Results: By emphasizing rigorous question formulation at the inception of the research process, investigators can better assess the scientific merit of their work. Implementing these strategies supports improved research planning, enhances the quality of scientific output, and establishes a robust foundation for long-term academic, reduced research waste and professional development.

Conclusion: Developing proficiency in research question selection is critical for producing high-impact, sustainable contributions to healthcare. Early integration of these frameworks enables early-career researchers to navigate the complexities of modern biomedical inquiry and maximize their potential for academic success.

Keywords: Biomedical Research; Research Design; Mentoring; Evidence-Based Practice; Evidence Gap; Problem Solving.

1. Introduction

In the rapidly evolving ecosystem of healthcare research, the ability to identify and formulate the right research question that is both worthy of investment and situated at the cutting edge of knowledge become paramount for healthcare researchers, practitioners, and policymakers. However, the researchers today face an overwhelming array of health information and challenges that can obscure the path to conducting impactful research. As novice researchers competitively struggle to survive by publishing their research reports, it becomes compulsory to develop a systematic approach to identifying research questions that contribute to the existing body of knowledge and push the boundaries ahead at the same time. Therefore, the present communication aims to outline strategies for identifying relevant and innovative research questions. Unfortunately, failure to answer pertinent questions from the outset can lead to the waste of resources, time and funding while diminishing the overall impact of scientific exploration. Therefore, biomedical researchers need to shape well-defined research questions from the very beginning to reach meaningful outcomes. While a longer list can be imagined, below, we'll highlight a number of resources for motivated junior researchers.

In fact, the pursuit of curiosity-driven research remains a cornerstone of scientific advancement. Fostering a culture of curiosity and open inquiry can encourage researchers to ask bold and creative questions that challenge existing paradigms. In shaping such an environment that nurtures intellectual curiosity, academic institutions can play an impressive role by allowing researchers to pursue questions that they find personally meaningful. Providing support for exploratory research, such as seed funding

for innovative ideas, can stimulate creativity and lead to the discovery of impactful research questions. This can be achieved through mentorship, collaboration, and institutional support for exploratory research. Often termed 'blue-sky research,' this mode of inquiry emphasizes exploratory questioning over immediate problem-solving, creating a fertile ground for serendipitous discovery. Such unstructured exploration has historically yielded transformative outcomes; most notably, the serendipitous observation of bacterial inhibition by Alexander Fleming revolutionized medicine. By protecting the autonomy of researchers to pursue high-concept, non-linear inquiries, the scientific community preserves its capacity for the transformative leaps that define modern progress.

2. Sources of research topics

2.1. Focus on certain avenues of academic scholarship

The first and most pertinent strategy is to stay updated and focused on specified routes of academic scholarship. If researchers are aligned with disciplinary textbooks and journals, and focus on technical sub-branches of their discipline, novel ideas and pertinent research questions will consequently emerge out of their reading efforts. While finding a research question is a key step, embarking on a research project requires immersing in existing literature in order to see if the question is already investigated or not. In fact, a thorough literature review can reveal existing gaps, ongoing debates, and previously unanswered questions. Finally, by synthesizing current knowledge, researchers can pinpoint specific areas ripe for investigation, ensuring that they do not replicate past efforts without adding new insights.

2.2. Keep reading the scientific journals

A second step is engaging with reading the publications of innovative journals and preprint repositories. Current journals are invaluable resources for identifying trends and gaps in research. A systematic approach to reading these journals involves not only focusing on groundbreaking studies but also critically analyzing their limitations and suggested future directions. Moreover, special issues or thematic collections often highlight emerging areas of interest within biomedical research. In addition, innovative journals and preprint platforms such as [arXiv](#) and [bioRxiv](#) serve as vital resources for accessing the latest research. These platforms enable researchers to share their work before formal peer review, facilitating timely feedback and enhancing scientific communication, and foster a culture of immediate scientific discourse (1).

2.3. Review the top level of evidence

Thirdly, researchers may utilize the highest levels of evidence (i.e., systematic reviews and meta-analyses) by constantly perusing science articles. As a foundational methodology in medical research, they synthesize existing studies to provide a comprehensive overview of a particular topic, highlighting gaps and inconsistencies in the current literature. A dynamic approach can help researchers identify emerging areas that require further exploration by revealing unanswered questions and areas ripe for exploration (2), thus ensuring that their questions are grounded in the realities of the current scientific landscape.

2.4. Consider completed theses and dissertations

The fourth advice involves reviewing recently-completed research reports such as

theses and dissertations (e.g. at ProQuest Dissertations & Theses) which can offer insights into areas that may still require investigation. In order to identify emerging trends and patterns, junior researchers may also review scientometric and bibliometric studies. This can be achieved through regular engagement with online libraries and scientific journals, attending conferences, and participating in academic discussions.

2.5. Consider completed theses and dissertations

Also, the advent of advanced technological tools in data science and bioinformatics has transformed the way researchers identify and explore research questions. Predictive analytics and personalized medicine emerged in response to real demands after the rise of artificial intelligence (AI) in healthcare. With vast amounts of medical data generated daily, employing sophisticated algorithms can help in analyzing trends, patient outcomes, and treatment efficacy. Also, data mining, machine learning, and natural language processing can be employed to analyze vast amounts of data and uncover patterns that may lead to novel research inquiries (3). These technologies can help researchers efficiently sift through large datasets to identify gaps in knowledge and formulate research questions that address pressing issues in healthcare fields. In addition, evidence gap mapping (EGM) can serve as a strategic visual tool in healthcare and medical research by systematically pinpointing the critical gaps, thereby helping researchers prioritize future research agendas and resource allocation (4).

2.6. Attend scientific events and gatherings

Research educators further recommend attending workshops and conferences for networking opportunities and hunting novel

ideas and research questions. Conferences remain pivotal in highlighting emerging trends and key topics in medical research. They not only provide platforms for researchers to share their findings but also facilitate collaboration and networking opportunities. Most global and regional events offer insights into the latest research and emerging methodologies. Conference presentations often predict future trends and signal their importance in setting research agendas (5). Junior researchers may attend conferences, and make use of discussions and presentations which often highlight ongoing research problems. In the sideline of most conferences, workshops are held to help less experienced researchers focus on these emerging areas needing further exploration.

2.7. Foster interdisciplinary collaboration

The next avenue for developing research questions involves developing interdisciplinary collaboration because collaborating with experts from different fields usually encourages researchers to think beyond traditional boundaries and explore multifaceted approaches to complex problems. Such cross-pollination of ideas can yield innovative research questions that may not have otherwise arisen within a single disciplinary framework. For example, a study on lifestyle changes of individuals with type 2 diabetes could incorporate insights from nutrition, physical exercise, stress management and drug therapy, leading to a richer understanding and more comprehensive research questions. Moreover, by bringing experts from diverse fields together, researchers can gain new perspectives and insights that may not be apparent within the confines of a single discipline, and begin to identify questions that challenge traditional boundaries and contribute to a more holistic understanding of complex issues. For instance, the intersection

of physiology and psychology has led to groundbreaking research on homeostasis interventions (6).

2.8. Leverage Electronic Health Records (EHR) for Clinical Research

Another relevant and rich source for taking the initial steps involves analyzing clinical data from patients, in collaboration with healthcare providers and accessing anonymized patient records. For instance, a retrospective review of hospitalization data may unravel an increase in cases related to a specific condition, such as diabetes-related complications or post-operative infections. Such findings can inspire research questions focused on understanding the underlying causes, evaluating intervention strategies, or assessing healthcare delivery models.

2.9. Stakeholder Engagement and Identification of Research Priorities

Similarly, one can take practical steps by engaging with real stakeholders and listening to their voices in order to streamline the relevancy and appropriateness of research questions. Engaging with medical practitioners, patients, health policymakers, and industry representatives ensures that research questions identified and addressed reflect real-world needs and challenges in healthcare contexts (7). This collaborative approach not only addresses the relevance of the research but also fosters a sense of belonging among stakeholders, facilitating the implementation of findings in real-world settings.

2.10. Engage in collaborative research platforms

To maintain scientific momentum and thematic relevance, researchers need to actively engage with evolving digital

research ecosystems. Modern collaborative platforms take a step beyond simple networking, evolving into sophisticated hubs for real-time inquiry and data synthesis. While foundational platforms such as ResearchGate and PubPeer remain vital for peer dialogue and post-publication critique, the current landscape is increasingly defined by AI-augmented discovery tools and Open Science frameworks that facilitate rapid cross-disciplinary synergy. Beyond traditional academic databases (e.g., PubMed for biomedical precision, IEEE Xplore for technological frontiers, and JSTOR for multidisciplinary depth) researchers now utilize semantic search engines and AI-driven literature mapping tools to navigate complex knowledge landscapes. These tools allow for the automated identification of research gaps and the real-time monitoring of emerging trends. Furthermore, integrating professional microblogging and real-time scholarly feeds enables researchers to participate in the live discourse of their fields, transforming passive literature review into an active, participatory process of knowledge construction.

2.11. Evaluate the feasibility and impact of research questions

Once potential research questions are identified, one should begin to evaluate the feasibility and impact of research questions, by a close scrutiny of available resources, funding opportunities, and the potential for collaboration. Researchers should critically evaluate whether their questions can be realistically addressed within the constraints of their research environment. Additionally, researchers should consider the broader implications of their work. The importance of aligning research priorities with societal needs is emphasized to maximize their impact (8). Questions that address pressing lifestyle challenges, such as weight gain and obesity, are likely to attract interest and

support from funding agencies and stakeholders.

2.12. Attend mentorship programs

The final recommendation for novice researchers is to closely engage with senior faculty and enroll in mentorship programs with those who offer deeper insights into specific gaps and emerging topics within their disciplines. This further involves an iterative question development, and helps them to avoid formulating unripe research questions as a one-time event because less experienced researchers need to be open to evolving and refining their questions based on feedback, pilot studies, and preliminary data collection. Engaging in discussions with peers or mentors may illuminate potential weaknesses in initial question formulations and provide constructive suggestions for improvement. Embracing this flexibility allows researchers to adapt their inquiries in response to new insights or changing circumstances, ultimately leading to more relevant and impactful research.

3. Conclusion

Shaping the right research questions from the beginning of a research journey is paramount in minimizing research waste and maximizing the impact of scientific inquiry. By focusing on specified routes of academic scholarship, reading the publications of innovative journals, utilizing systematic reviews and meta-analyses, reviewing completed research reports, familiarizing with data analytics and machine learning, fostering a culture of curiosity and open inquiry, attending conferences, fostering interdisciplinary collaboration, engaging with stakeholders and listening to their voices, joining collaborative research platforms, evaluating the feasibility and impact of research questions, and attending

mentorship programs for reiterative question development, researchers can cultivate research questions that truly matter. The integration of these methods can empower researchers to stay informed and engaged with the latest developments in healthcare, ultimately enhancing the quality of care and fostering innovation.

As less experienced researchers strive to address the pressing challenges facing our society, it is imperative that we invest our intellectual and financial resources in research questions that advance knowledge and, more importantly, contribute to the quality and efficacy of our healthcare services. Through a concerted effort to align research inquiries with real-world needs, we can foster a more impactful and responsive scientific enterprise. In fact, the identification of cutting-edge topics in medical research necessitates adoption of dynamic methodologies and resources.

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Conflict of Interest

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